

CIM FIELD TRIP  
MOUNT POLLEY MINE

885562

Tom Schoen  
May 26/00  
CIM, North Central  
Branch, Williams Lake  
(Williams Lake meeting)

General

The Mount Polley open pit gold/copper mine is located 56 kilometres northeast of Williams Lake in central British Columbia. The mine was built by Imperial Metals Corporation in 1996-97 with a design capacity of 18,000 tonnes per day and went into production in June 1997.

Mount Polley was initially owned 55% by Imperial Metals and 45% by SC Minerals Canada Limited, a wholly owned subsidiary of Sumitomo Corporation. Imperial Metals sold a 2.5% interest in the Mount Polley mine for US\$875,000 in July 1999. This transaction helped Imperial meet the revised loan repayment schedule for this mine when metal prices were at their lowest point in many years. Mount Polley is now owned 52.5% by Imperial Metals who is the operator, and 47.5% by SC Minerals Canada Limited.

History

Copper was first discovered on Mount Polley in 1964. In the period from 1966 to 1972, Cariboo-Bell Copper Mines Limited completed 18,341 metres of diamond drilling and 8533 metres of percussion drilling in 215 holes. In 1981, E & B Explorations Inc. optioned the property from Highland Crow and that year completed 1746 metres of diamond drilling, 1295 metres of rotary drilling and a soil geochemical survey. Work completed from 1982 to 1987 included 3585 metres of diamond drilling and 4026 metres of reverse circulation overburden drilling, as well as soil geochemistry, geological mapping, magnetics, ground geophysics and induced polarization. In 1988 Imperial Metals Corporation completed an induced polarization survey and trenching, plus an additional 99 diamond drill holes totalling 8878 metres. In 1989, a further 139 holes totalling 18,639 metres of diamond drilling were completed to detail reserves in the Central and West zones. A total of 535 percussion, rotary and diamond drill holes, comprising of 62,482 metres of drilling, were completed to the end of 1989.

Geology

The deposits occur within alkalic early Jurassic Polley stock rocks which have intruded Nicola Group volcanic rocks. The Nicola Group in the area comprises a sequence of alkali basalt breccias and flows of Upper Triassic (Norian) age overlain by polyolithic breccias characterized by the presence of felsic clasts of Lower Jurassic (Pliensbachian(?)) age. The stock which hosts the copper mineralization is a complex of several intrusive phases ranging in composition from diorite to syenite. Pyroxenite and gabbro have been intersected in drill holes while nepheline syenite dated at 201 Ma occurs to the west (the Bootjack stock) and presumably represents a more differentiated phase of the Cariboo-Bell intrusions.

PGEs?

Alteration is zonal with an outer propylitic zone, consisting of a calcite-epidote-chlorite-pyrite assemblage, surrounding a potassic zone characterized by secondary biotite and pink orthoclase with diopside. Between the inner potassic zone and the outer propylitic zone is an intermediate garnet-epidote zone. Zeolites are ubiquitous within altered rocks and, although some may be the result of metasomatism associated with hydrothermal fluids, most zeolitic alteration, especially in the outer alteration zone, may be the result of burial metamorphism of regional extent.

Copper-gold mineralization occurs within a variety of breccias and extends into the surrounding volcanic rocks (see attached figure). The two dominant breccia types are crackle breccias, typical of porphyry systems, and intrusion breccias. Six zones of significant mineralization have been defined within the breccias.

Hypogene minerals in ore zones include chalcopyrite (1 to 3 per cent), magnetite (4 to 8 per cent) and minor pyrite while supergene minerals include malachite, native copper, *+ chrysocolla*, cuprite, chalcocite, neodigenite and covellite. Gold occurs as microscopic inclusions in chalcopyrite. The abundance of copper-gold mineralization is reported to be proportional to the intensity of brecciation

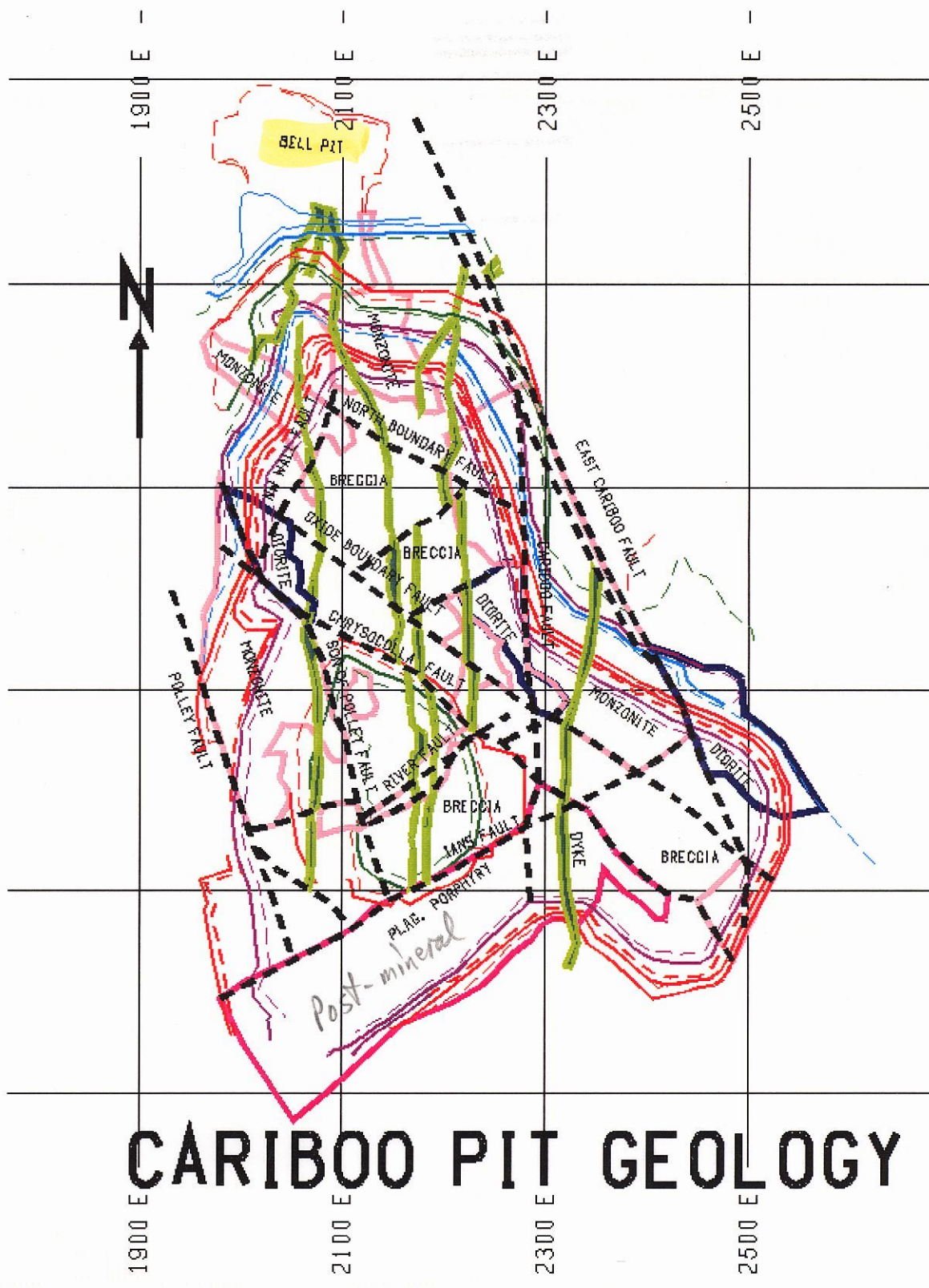
### Mining

During 1999, 15.04 million tonnes of material was mined from the Cariboo Pit, of which over 6.65 million tonnes were ore. In addition 99,417 tonnes of material was mined from the upper bench of the Bell Pit, of which 89,353 tonnes were ore. The mine continued to segregate low grade material in response to low metal prices. This material is defined as that which is uneconomic at current metal prices, but would be economic at Feasibility Study metal prices. At the end of 1999 a total of 896,793 tonnes of low grade material had been stockpiled for future processing. *JX*

Since start up, approximately 16.65 million tonnes of ore grading 0.589 grams per tonne gold and 0.329% copper have been mined at Mount Polley. Ore reserves for the Bell and Cariboo Pits will be updated following the completion of the exploration program described in the Exploration section below.

### Milling

The Mount Polley concentrator processed a total of 7.09 million dry metric tonnes for the period January 1 to December 31, 1999, a 22% increase from the 5.8 million tonnes milled during the same period in 1998. Metal recoveries were also improved with copper recovery being 35% higher and gold recovery being 9.3% higher than the levels achieved in 1998. These improvements reflect steadier operations in the second full year of operations, plant improvements, and lower copper oxide ratios.



# CARIBOO PIT GEOLOGY

## **Production Statistics**

	1999	1998	1997
Ore milled (tonnes)	7,090,465	5,829,701	2,450,000
Ore milled per calendar day (tonnes)	19,426	15,972	
Ore milled per operating day (tonnes)	21,299	17,506	
Grade (%) - Copper	0.343	0.363	
Grade (g/t) - Gold	0.566	0.766	
Recovery (%) - Copper	69.35	51.40	
Recovery (%) - Gold	77.40	70.80	
Copper produced (lbs)	37,100,904	23,920,437	8,770,000
Gold produced (ounces)	99,585	101,729	19,600

## **Exploration**

Exploration in 1999 included drilling in the Bell Pit and at the south end of the Cariboo Pit. In the Bell Pit, immediately north of the Cariboo Pit, diamond drilling totaling, 1,946 metres in eight holes tested the Bell deposit to depth and along the north and east limits. Immediately south of the Cariboo Pit, five diamond drill holes totaling 1,011 metres were completed in the recently discovered C-2 Zone and an additional five holes totaling 1,110 metres were drilled under the south end of the Cariboo Pit to test the Deep Cariboo Zone. Finally, 33 short percussion holes totaling 1,385 metres were drilled south and east of the Cariboo Pit.

A drilling program was approved and commenced in March, 2000 to follow up on the 1999 drilling in the two zones of the Cariboo Pit area. Preliminary results are encouraging. Recent drilling has intersected significant mineralization south of the Cariboo Pit area.

## **Environmental**

Two research programs initiated in 1998 were continued in 1999. One program evaluates various soil application prescriptions for reclamation of the surface and slopes of the rock disposal sites. The second program is designed to facilitate long term material handling strategies through increasing the predictability of mine drainage water quality.

## Mill Operation – Mount Polley

Ore is first delivered to our 3 stage Crushing Plant where it is broken down and screened to minus 5/8 inch for final delivery to the Fine Ore Pile, which feeds the Mill.

These 3 Crusher Stages are:

1. **The Primary Stage** where the ore is broken down to minus 6 inch. This stage is collected at the coarse ore stockpile.
2. **The Secondary Stage** is fed from the coarse ore stockpile. This involves running the ore over a triple deck screen, which produces 3 products (3 screen sizes – 4, 2 & ¾ inch):
  - i. Minus 5/8 inch to the fine ore stockpile (bottom deck – ¾ inch).
  - ii. Split feed of plus 2 inch & minus 4 inch is scalped to the Pebble Stockpile (the rest of the product that does not pass through the 2-inch screen (middle deck) is crushed to 1 inch in the secondary crusher for delivery to the Tertiary Stockpile).
  - iii. Anything that does not pass through the 4-inch screen (top deck) is crushed to 1 inch and delivered to the Tertiary Stockpile.
3. **The Tertiary Stage** (3 separate crushers) is fed from the Tertiary Stockpile, over 3 separate single deck screens. Whatever passes through the screen feeds the Fine Ore Stockpile (minus 5/8 inch) and the rest is crushed by the tertiary crushers to ¼ inch and fed back to the Tertiary Stockpile.

The fine ore comes into the mill to be ground down from rocks into what we call slurry. This is done with the addition of water to the ore as it enters the Rod Mills. During the grinding process the ore has to be ground up fine enough so that the valuable mineral that is locked up in all the waste rock is free for us to extract as our ongoing process. Grinding of the ore takes place when the steel or pebbles in the turning mill are lifted and then dropped as the mill turns. This action causes an impact in which the ore is broken down. From the introduction of the ore into the mill to the point where we can send the final product out and make money involves 4 stages which are:

### **Grinding**

The Primary Grinding Circuit involves 2-Rod Mills, each loaded with approximately 200 tons of 4 inch x 17.5 foot rods (each rod weighs 340.7 kgs or 751 lbs.) & 3 Ball Mills, each loaded with approximately 240 tons of 2 & 2.5 inch steel balls.

As the ground up slurry exits these mills it is pumped from the basement through a set of cyclones, which by action similar to a centrifuge separates the coarser particles from the fines. The coarser material is fed into the Ball Mill for further grinding and the finer material is sent to the Secondary Grinding Circuit for regrinding.

The Secondary Grinding Circuit, which involves 3 Pebble Mills, each loaded with mixed balls (2 & 2.5 inch) and Pebbles from the Crusher Circuit and as mentioned takes the fines from the Primary Side and pumps this material through another set of cyclones. The coarser material this time is fed into the 3 Pebble Mills for regrinding and the finer material is our feed to the Flotation Circuit.

## Flotation

Flotation involves the introduction of chemicals to aid in the floating of the valuable mineral to the surface of the float cell. The chemicals we use are:

**Sodium Isopropyl Xanthate (SIX)** – Used as a collector of the mineral where it coats the mineral to make it water repellent so the froth bubble will attach it and float to the surface.

**Sascol** – Used as a collector in the flotation of gold. Tends to be more selective than the SIX collector.

**Methyl Isobutyl Carbinol (MIBC)** – Used as a frother, which with the addition of air and agitation in the float cell produces bubbles that enable the mineral to float.

**Sodium Hydrosulfide (NaHS)** – Used at times when we have a high oxide content in our ore. This chemical sulfidizes the oxide mineral, which enables it to be coated by the SIX, thereby making it floatable.

Once the mineral is floated we collect it and send it to the thickening stage.

## Thickening

The mineral in slurry is pumped to 2 thickeners where with the addition of a settling agent (Flocculant) it settles to the bottom of the thickener. Here it is collected by rakes and pumped over to the holding tank in preparation for filtering. We have to thicken the slurry in order for it to filter properly.

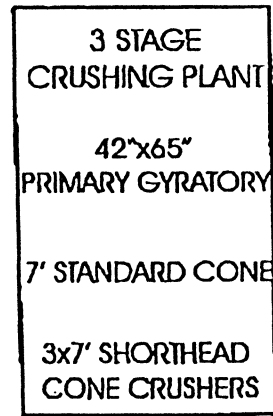
## Filters

This is the final stage of our operation. Here the mineral is filtered to a dry as possible cake (all water is removed) and sent out to the concentrate shed for shipping. We like it as dry as possible so we do not have to pay for the shipping of water. A good moisture content is around 9 %. If we shipped out moisture contents around 15 % there is a likelihood that the 5500 tons in the ship could liquefy in the high seas and the ship could sink.

IR

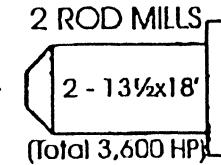
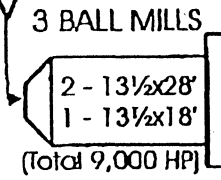
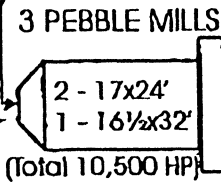
# MOUNT POLLEY PROCESS FLOWSHEET

1998



PEBBLES  
-4" +2"  
1,000 TPD

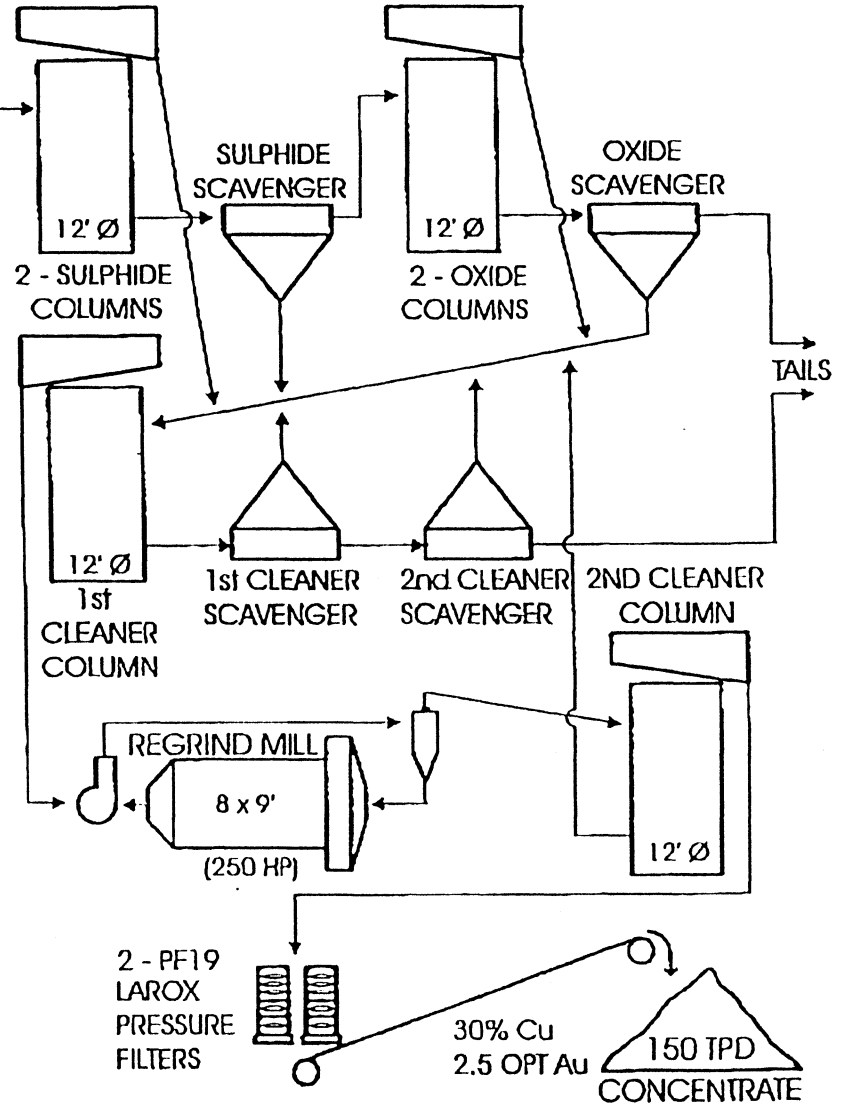
TO FLOTATION  
66% -200 #



-5/8"  
19,000 tpd  
0.37% Cu  
0.022 OPT Au

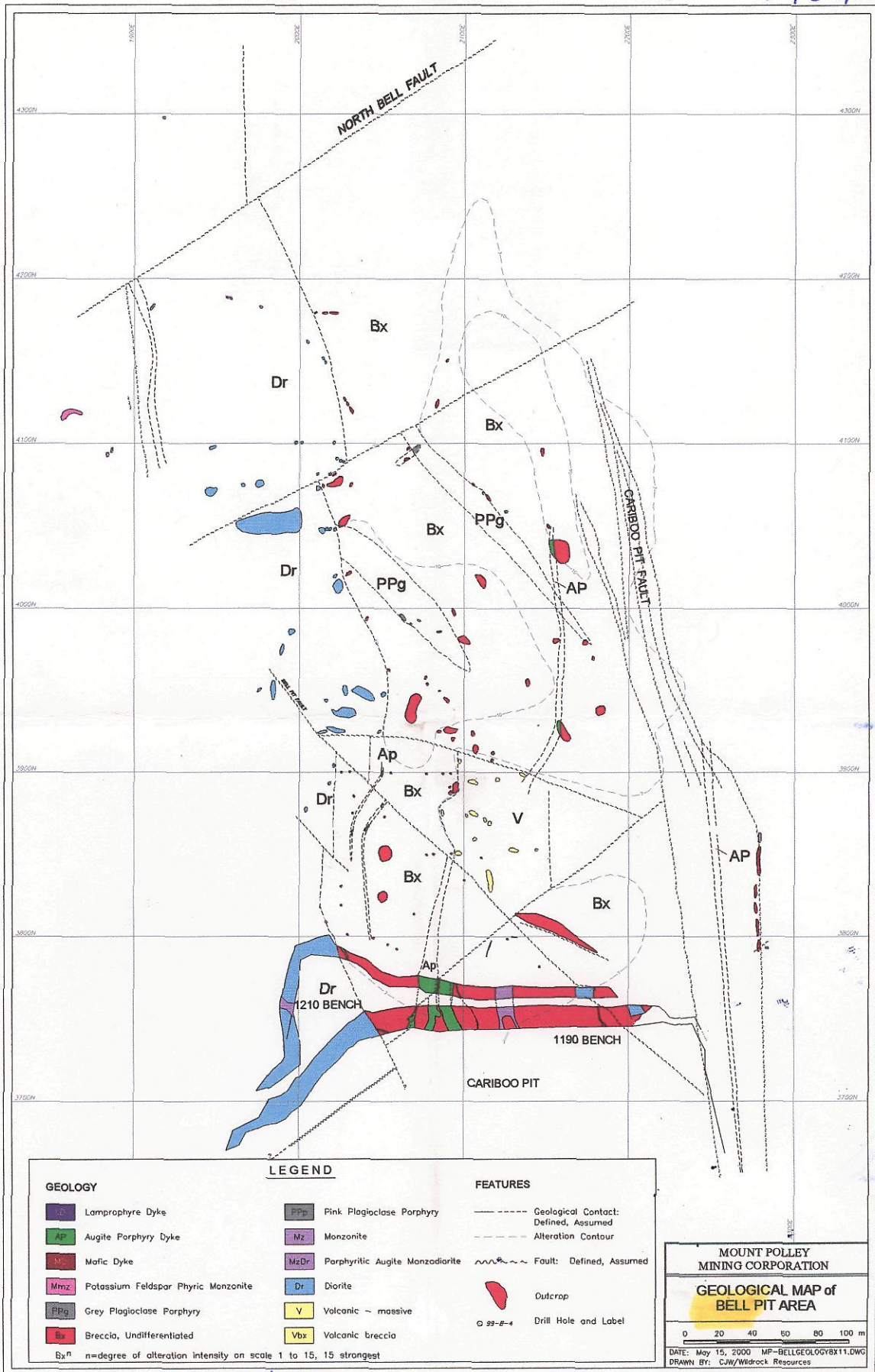
RADIAL STACKER

FINE ORE STOCKPILE  
60,000 t.



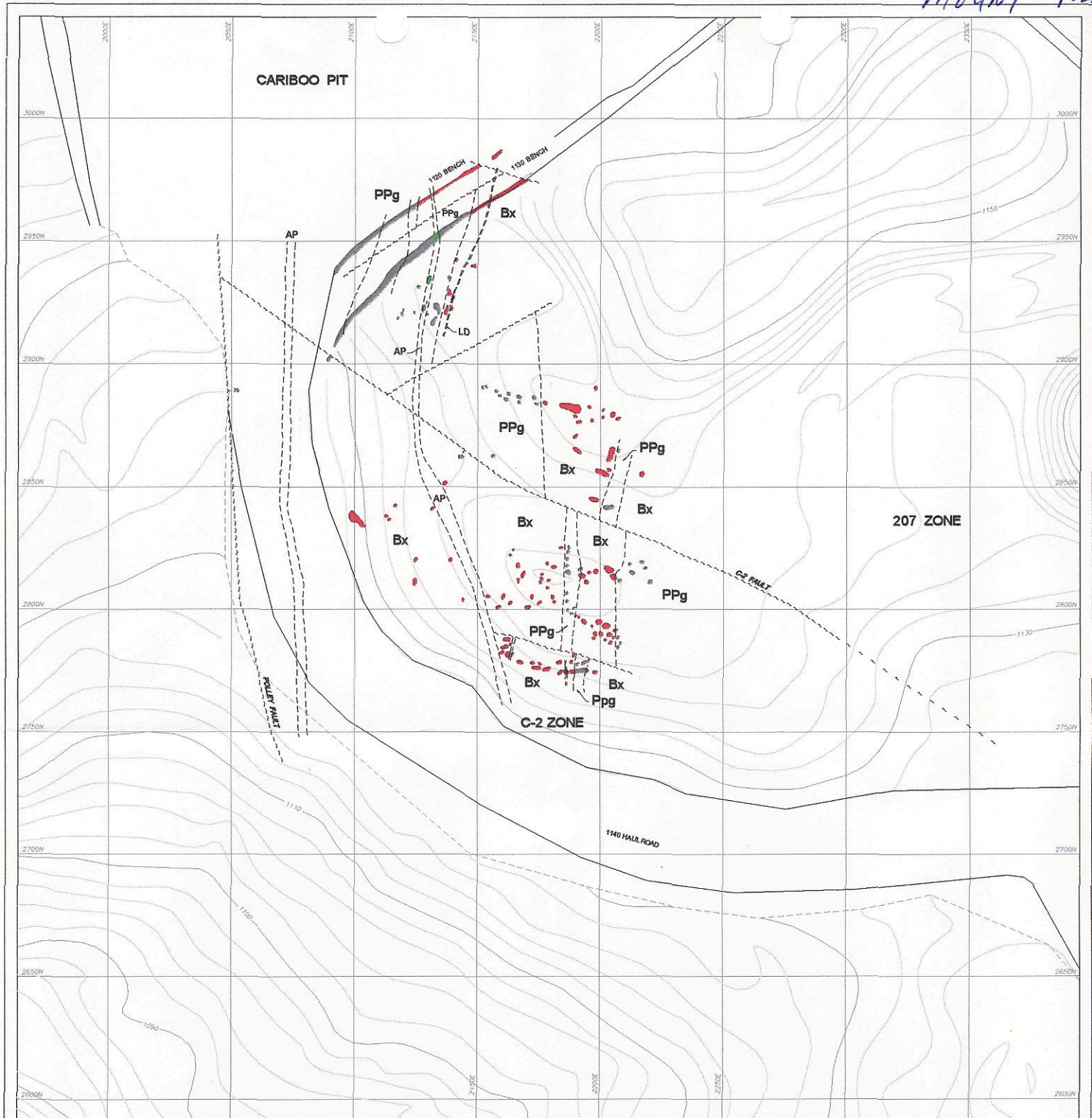
**Imperial Metals Corporation**

MOUNT POLLEY



CIM, North-Central Branch Tour May 26/00  
 Tom Schwartz





GEOLOGY		LEGEND		FEATURES	
	LD Lamprophyre Dyke		PPg Pink Plagioclase Porphyry		Geological Contact: Defined, Assumed
	AP Augite Porphyry Dyke		Mz Monzonite		Alteration Contour
	MD Mafic Dyke		MzDr Porphyritic Augite Monzodiorite		Fault: Defined, Assumed
	Mmz Potassium Feldspar Phyric Monzonite		Dr Diorite		Outcrop
	PPg Grey Plagioclase Porphyry		V Volcanic - massive		
	Bx Breccia, Undifferentiated		Vbx Volcanic breccia		
Bx <sup>n</sup> n=degree of alteration intensity on scale 1 to 15, 15 strongest					

**MOUNT POLLEY MINING CORPORATION**

**GEOLOGICAL MAP OF C-2/207 AREA**

0 20 40 60 80 100m

DATE: May 15, 2000 MP-C2GEOLOGY-8X11.DWG  
DRAWN BY: CJW/Wildrock Resources

C1m, North-Central Branch Tour

Tom Schwedt May 26/00

# **CIM North Central BC**

## **Branch 3<sup>rd</sup> Annual**

### **Spring Meeting May**

#### **26<sup>th</sup> to 27<sup>th</sup>.**

Mine Tour: May 26<sup>th</sup> 'Present and Past Mining Operations, Likely Area.  
- Will visit Mount Polley Mine and Historic Bullion Placer Pit.

#### **Tour Itinerary**

- Bus will leave from front of Overlander Hotel 8:00 AM
- Bus will arrive Mount Polley at 9:30 AM

#### **MOUNT POLLEY MINE**

- Introduction by John Scott, Manager Human Resources.
- Mine Tour - 18 participants - guide Erin Tough
- Mill Tour - 10 participants - guide Doug Watt
- Geology Tour - 14 participants - guide Greg Gillstrom

Lunch provided by Mount Polley Mine.

- bus will leave Mount Polley at 1:15 P.M.

#### **PLACER MINING HISTORY / BULLION PIT TOUR**

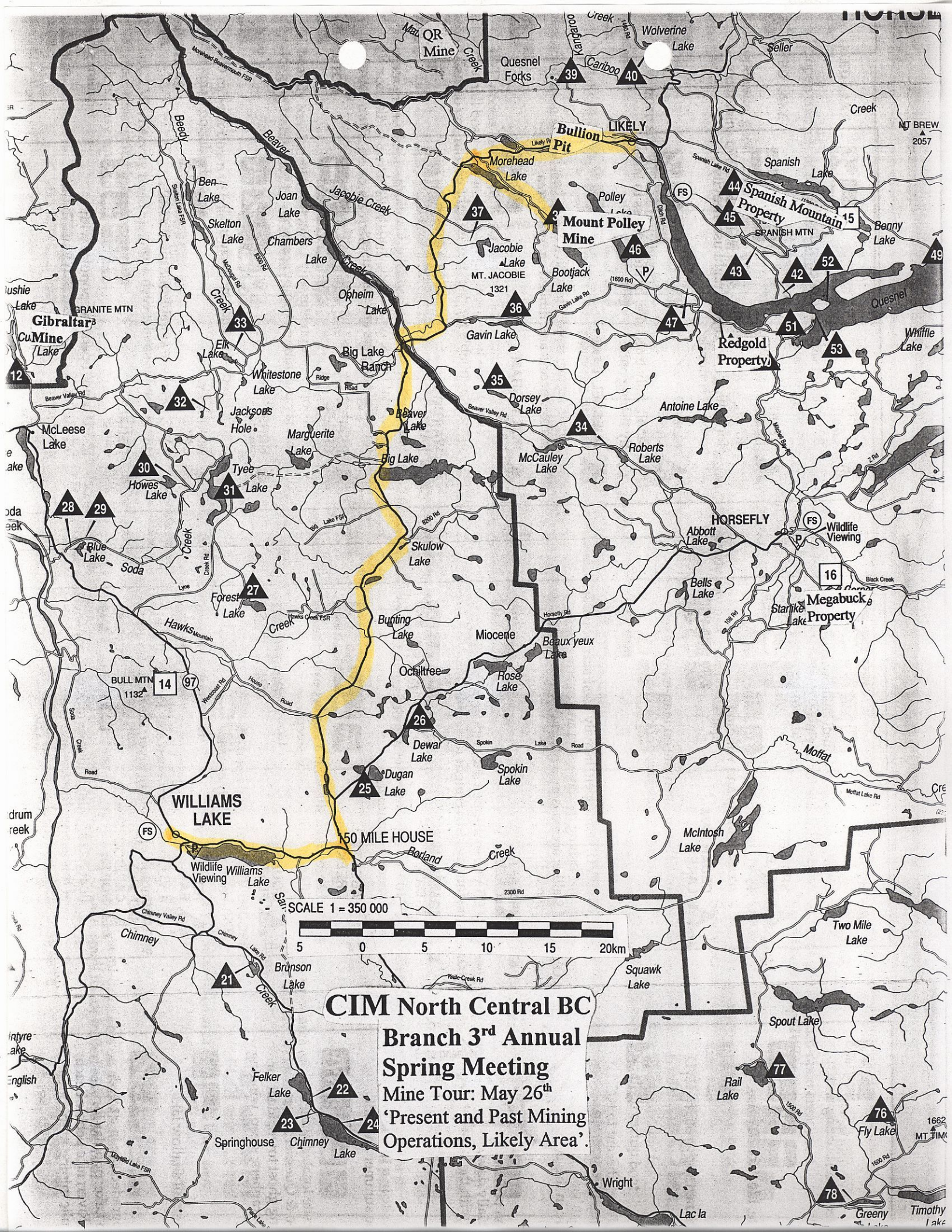
- Marie Hampton will guide us and provide commentary on the way to and at the Bullion pit. <sup>(Likely Hotel)</sup>

- the bus will then go to the Likely Deacon Hotel for some local history by Brian Geisbrecht and refreshments.

- Bus will leave Likely to return to Williams Lake at 4:45 P.M.

Tour will finish in front of the Overlander Hotel just after 6:00 P.M.

Thank you.



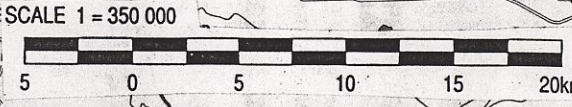
**Gibraltar Cu Mine**

**Bullion Pit**

**Mount Polley Mine**

**WILLIAMS LAKE**

**CIM North Central BC  
Branch 3<sup>rd</sup> Annual  
Spring Meeting  
Mine Tour: May 26<sup>th</sup>  
'Present and Past Mining  
Operations, Likely Area'.**



Map labels include: Gibraltar Cu Mine, Bullion Pit, Mount Polley Mine, Williams Lake, Spanish Mountain Property, Redgold Property, Megabuck Property, and various lakes such as Morehead Lake, Polley Lake, Bootjack Lake, and Williams Lake. Creeks shown include Beaver Creek, Jacobie Creek, and Skulow Creek. Other locations marked include Quesnel Forks, Spanish Lake, and Whiffle Lake. The map also shows various roads and geographical features like Mt. Jacobie and Mt. Brew.

MOUNT POLLEY / BULLION				
LIKELY TOUR				
May 26, 2000.				
NAME	AFFILIATION	Mining	Milling	Geology
Adams, Rick	Ministry of Energy and Mines	1		
Bottaro, J.C.	Huckleberry Mines	1		
Bouchard, Richard	Strongco Supplies	1		
Brouwer, Ken	Knight Pieshold	0.5	0.5	
Callaghan, Frank	International Wayside	1		
Cameron, Rob	Phelps Dodge Corp of Canada			1
Clarke, Mark	Strongco Supplies	1		
Dennis, Dorothy	Noble Metal Group Inc	0.5		0.5
Dhallwal, Ranby	Highland Valley Copper	0.5	0.5	
Dillon, Patrica	CIM National President	1		
Dilney, Shaun	Alta Steel		1	
Durfeld, Rudi	Durfeld Geological Management			1
Durfeld, Lucas		1		
Embree, Ken	Knight Pieshold	0.5	0.5	
Exton, Monty	Exton Dodge and Galbois	0.5	0.5	
Fossen, Doug	Fossentech Services	1		
Foster, Penny	Taseko Mines	0.5	0.5	
Goodall, Geoff	Global Geological			1
Gunn, Jim	Lywan Exploration			1
Hampton, Marie	Likely Hotel		1	
Jackson, William	Noble Metal Group Inc	0.5		0.5
Kenna, Dave	FMC of Canada	1		
Kier, Trevor	City of Williams Lake		1	
Kulla, Greg <i>Steve Wetherump</i>	Phelps Dodge Corp of Canada			1
Lane		1		
Lane		1		
Lane, Bob	Ministry of Energy and Mines			1
Lindinger, Leo	Renaissance Geoscience			1
Meister, Ron	Inland Timber		1	
Morton, Bill	Wildrose Resources Ltd.			1
Olsen, Irvin	Noble Metal Group Inc	0.5		0.5
Piekny, Vic	Strongco Engineering		1	
Plewes, Howard	Klohn-Crippen Consultants		1	
Reid, Robert (Ned)	Consulting Geologist			1
Rydman, Murray	Consulting Geologist			1
Schroeter, Tom	Ministry of Energy and Mines			1
Sword, Clint	Strongco Supplies	1		
Timmins, William	WGT Consultants	0.5		0.5
Van Duyn, Bill	Strongco Engineering		1	
Vanek, John	Cummins British Columbia	1		
Wild, Chris	Wildrock Resources			1
Winger, Ethel	Placer Miner	0.5	0.5	
		18	10	14