

80-082-700
Goldstream

825116

MACLAREN FOREST PRODUCTS INC.

GOLDSTREAM MINING DIVISION

PROPERTY DESCRIPTION

January 1988

MACLAREN FOREST PRODUCTS INC.

GOLDSTREAM MINING DIVISION

Location

The Goldstream copper-zinc property is located 65 miles north of Revelstoke, B.C. Access is via a 10 mile gravel road from Highway 23 which connects with the Trans Canada Highway at the City of Revelstoke. The deposit outcrops at the 920 metre elevation on the south slope of the Goldstream River Valley, in the Selkirk Mountain Range.

Total area covered by the "Surveyed" claims is 2990 acres, while the total Goldstream claim block has an area of 9,842 acres.

History

The deposit was discovered by three prospectors who traced pieces of sulphide float located along side a logging road. The first claims were staked in 1973. Following trenching and shallow diamond drilling by the prospectors, Noranda Exploration optioned the ground in 1974. Diamond drilling in 1975 outlined the known reserve, and this was followed in 1976 by an underground exploration program of drifting and detailed diamond drilling.

Geology

The deposit lies within a sequence of metamorphosed and deformed sedimentary and volcanic rocks. The shape is that of a "flattened rod" or "ruler" and although it occurs concordantly with the surrounding rock units and at a particular stratigraphic horizon, it rakes across the dip of the other units.

The general sequence of rocks encountered from hanging wall to footwall is as follows; dark banded phyllite, garnet zone, grey green phyllite, massive sulphides, grey green phyllite and metamorphic limestone.

The deposit consists of a single continuous bed of massive and disseminated sulphides varying in thickness from one to fifteen metres. The average thickness is three metres. The strike length varies from 340 metres at the outcrop to 180 metres at depth. The average dip is 33°. The rake is 45° off of true dip. The hanging wall and footwall contacts roll on dip as well as on strike. Total dip length is 1050 metres. The deposit is open at depth.

The zone outcrops at the 920 metre elevation on the south side of the valley. The Goldstream River crosses over the deposit at the 645 metre elevation. The valley slope is covered by four to six metres of glacial till with up to 30 metres of boulders and gravel in the valley bottom.

Initial Ore Reserves

A decision to place the property into production was taken in January 1980, and production started in May 1983. Reserves at the start of production were estimated at 4,343,700 tons grading 3.69% Cu, 2.63% Zn and 0.51 opt Ag.

Present Ore Reserves

The Goldstream ore reserves are summarized in the table on page 4. Cutoff grade is 2% copper and dilution is 26% at 0.42% copper and 0.34% zinc.

Exploration Potential

The ore zone is open at depth and has a potential for increased reserves. Massive sulphide deposits of this type (Besshi-type) tend to occur in clusters within a limited stratigraphic interval so that the potential for additional ore zones in the area is considered to be excellent.

In view of this, both an underground and surface drill program could be undertaken below the 400 metre elevation and north of the Goldstream river.

Third Party Interests

The original three prospectors have retained a 35% Net Carried Interest in the property; their interest is payable after Noranda has recovered its complete investment plus interest.

Employee Accommodations

During the operating period, approximately 60% of Goldstream employees lived in Revelstoke and traveled daily to the mine. The balance who chose to reside on site during the work week, but to return home on weekends, were housed in dormitories located three miles from the mine.

Shutdown

On April 16, 1984, it was decided to place the Goldstream Division on a care and maintenance basis. One year later a long-term shutdown policy was adopted. Under this program a staff of five (5) persons was retained for security and maintenance services.

These functions included: maintenance of mine pumping; dismantling and storage of materials handling (conveyor) components; removal and storage of electrical motors, drives and speed reducers. A thorough high pressure washing of processing equipment and final inspection was carried out before shutdown of the concentrator.

An inventory of the equipment remaining on site is noted below:

- 1 Allied rock breaker
- 1 Atlas Copco Roc 810H drill
- 1 Tamrock fixtrak drill
- 1 Jarvis Clark 220 scoop
- 3 "81" substations Federal Pioneer,U/G
- 1 Substation switching sled 400 amp,U/G
- 1 International water truck
- 1 GMC Suburban half-ton
- 1 Hiab truck c/w crane
- 2 1981 Ford 4x4 half-tons
- 1 Propane fork lift
- 1 J.C.B. backhoe and loader
- 1 Ambulance
- 1 Cat 930 loader
- 1 Cat 14G grader
- 1 Cat D8K tractor
- 1 Ski-doo alpine
- 3 1983 Ford 4x4 half-tons
- 1 Ventilation fan 34"

Other items which include facilities and inventory are as follows:

- 2 Property lots, Revelstoke
- 1 Office, Revelstoke
- 1 House, Revelstoke
- 3 Houses in process of sale
- 1 Powder mag
- Rail car covers
- Tire inventory
- Mine rescue equipment
- Extra office furniture
- Stores Inventory

Goldstream Ore Reserves As Of April 15th, 1984

A. Developed Ore To 655 M Elv.

<u>Location</u>	<u>Total Reserve 1</u>			<u>Mined To Date 2</u>			<u>Remaining Reserve 3</u>		
	<u>Tons</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Tons</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Tons</u>	<u>% Cu</u>	<u>% Zn</u>
Pit (to 860 Elv.)	361,007	4.04	3.13	250,776	3.24	1.88	110,231	3.23	1.84
830 (including sill)	217,767	4.04	3.13	19,618	3.82	2.05	198,149	3.89	1.93
770	391,600	4.20	2.66	23,733	2.88	1.91	367,868	3.64	2.29
715	396,101	3.44	3.01	80,952	3.69	2.92	315,150	4.39	3.87
655	412,665	4.26	3.05	117,580	3.60	2.60	295,084	3.93	3.00
Total Developed	1,779,140	3.99	2.98	492,659	3.41	2.23	1,286,482	3.89	2.75

B. Drill Indicated Ore To 400 M Elv.

655 To 400 M Elv.	2,212,653	3.29	2.35				2,212,653	3.29	2.35
-------------------	-----------	------	------	--	--	--	-----------	------	------

C. Total Developed & Drill Indicated

Pit to 400 M Elv.	3,991,793	3.60	2.63	492,659	3.41	2.23	3,499,135	3.51	2.50
-------------------	-----------	------	------	---------	------	------	-----------	------	------

Notes:

1 N.W. Berg, 1983

2 Mine Sample Grade Corrected to Mill Head grade

3 Grades are Based Sample & Diamond Drill Data Corrected to Mill Head grade

Dilution of 26% at 0.42% Cu and 0.34% Zn.

Cut off grade of 2% Cu

Mining Method

The top 20% of the orebody was developed for open pit mining and provided roughly 50% of mill throughput during the first year of production. As of April 15, 1984 there was 110,000 tons of ore remaining in the pit.

The underground mine has been developed to the 655 metre elevation. Access to the orebody is through portals at the 830 metre, 770 metre and 700 metre elevations. These access ways are connected underground via a ramp system, generally located off the west end of the deposit and in the footwall. A deep development program is required to access and mine the ore down to the 400 metre elevation.

The mining method was termed "Step Room and Fill". It is essentially a highly mechanized room and pillar method, which is designed to permit a high extraction rate. A plant to provide cycloned tailings as backfill was planned.

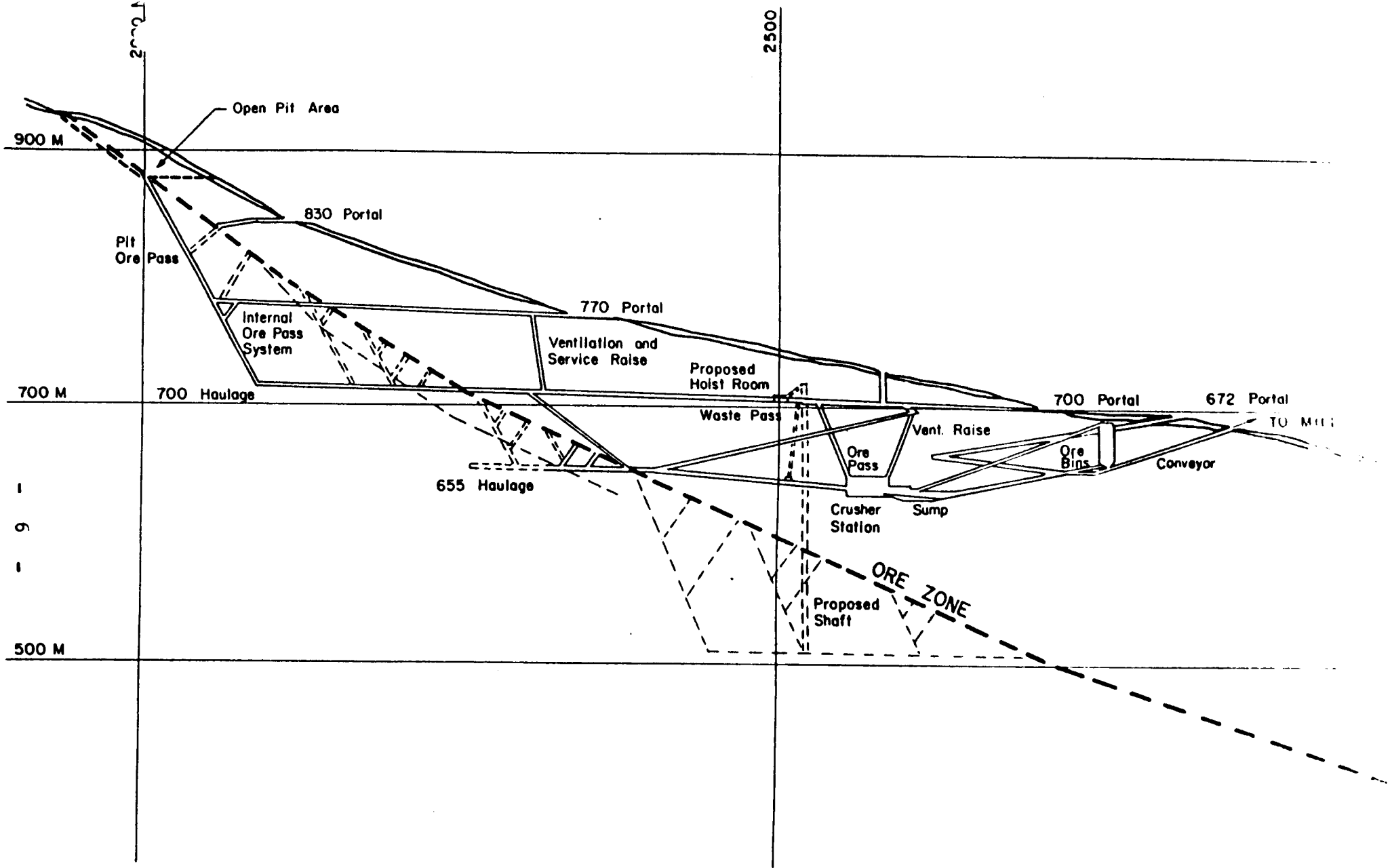
Sill drifts were driven at 60 metre elevations, along the hanging wall contact of the zone. A 17% ramp was driven from the west end of the zone to the east to break out at the next sill elevation. Horizontal sub-drifts were driven eastward off this ramp at 10 to 12 metre intervals. Actual stoping consisted of driving off these sub-drifts and hauling the ore to ore passes in the main ore ramp.

A vertical section and mining sequence diagram appear in Figures 1 and 2.

The mining method, while not fully tested, had been quite productive. Stope performances averaged 58.5 tons per manshift for the period September, 1983 to February, 1984. The general plan was to have three stoping blocks fully developed for stoping and a fourth under development by the time the open pit would be mined out.

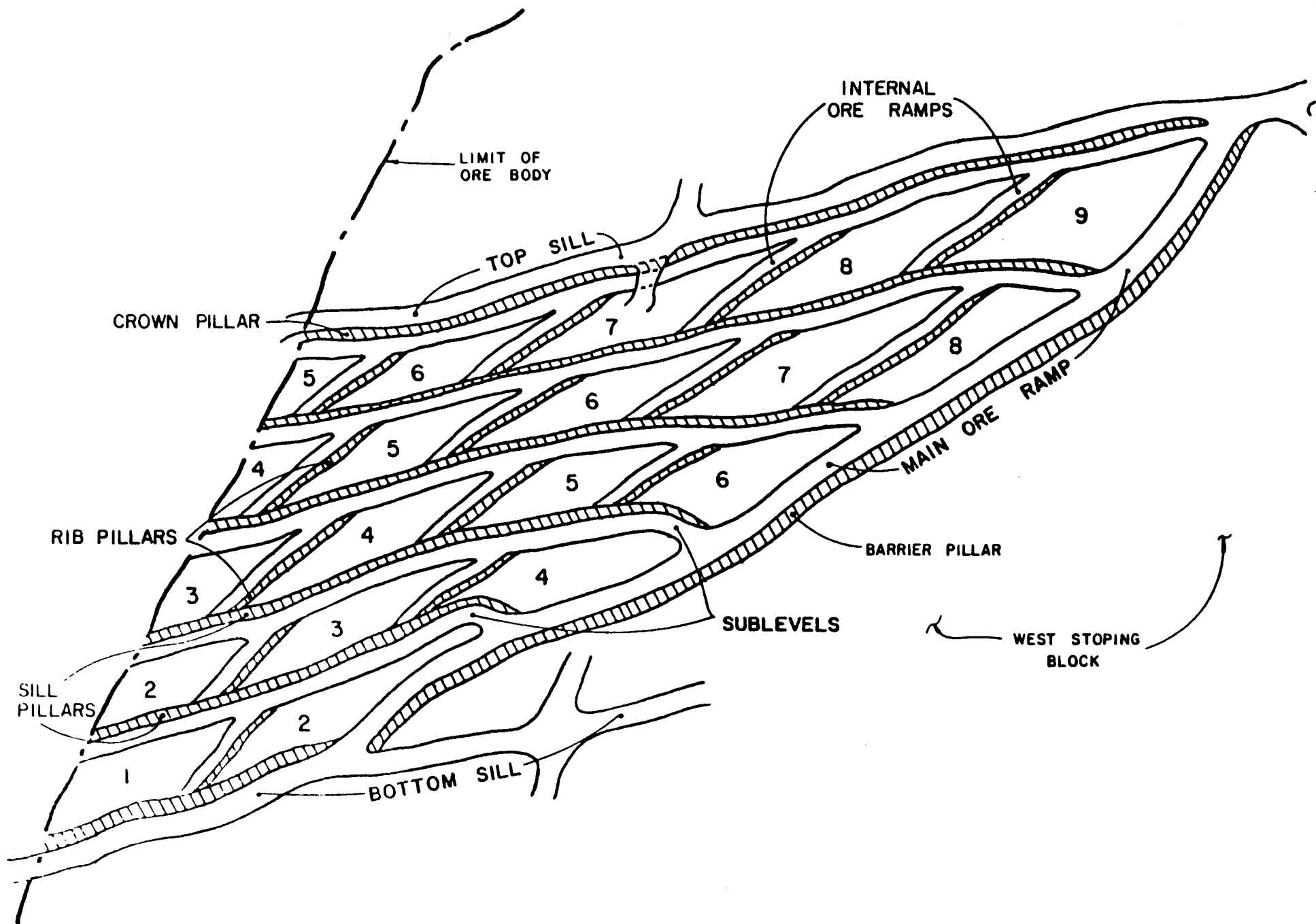
The mine has increased its production from startup in May 1983 to full production in February 1984 as follows:

	<u>Tons per Calendar Day</u>		
	<u>1983</u>		<u>1984</u>
	<u>May-Sept</u>	<u>Oct-Dec</u>	<u>Jan-Apr</u>
Stockpile	399	324	341
Underground	367	546	463
Open Pit	<u>539</u>	<u>506</u>	<u>636</u>
Tons Milled	1,305	1,376	1,440



VERTICAL SECTION OF UNDERGROUND DEVELOPMENT

FIGURE 1



MINING SEQUENCE OF THE EAST ORE BLOCKS

FIGURE 2

Ore Processing

The concentrator was rated at, and achieved, 1500 tons per day at 96% availability. It produced zinc and copper concentrates each containing silver.

The primary and secondary crushers and fine ore bin are located underground. Ore crushed to 5/8" size was delivered by conveyor from the fine ore bin directly to a 10½' x 13' rod mill for primary grinding. Flotation was conventional except for the use of SO₂ to depress zinc in a reverse flotation circuit. Thickening was conventional in a 50' diameter copper thickener and 28' diameter zinc thickener. Concentrate drying was done by Larox pressure filters.

Process control had been introduced utilizing an on-stream X-ray analyzer and Fisher Porter computer.

The zinc concentrate was trucked under contract from the minesite to the smelter at Trail, British Columbia.

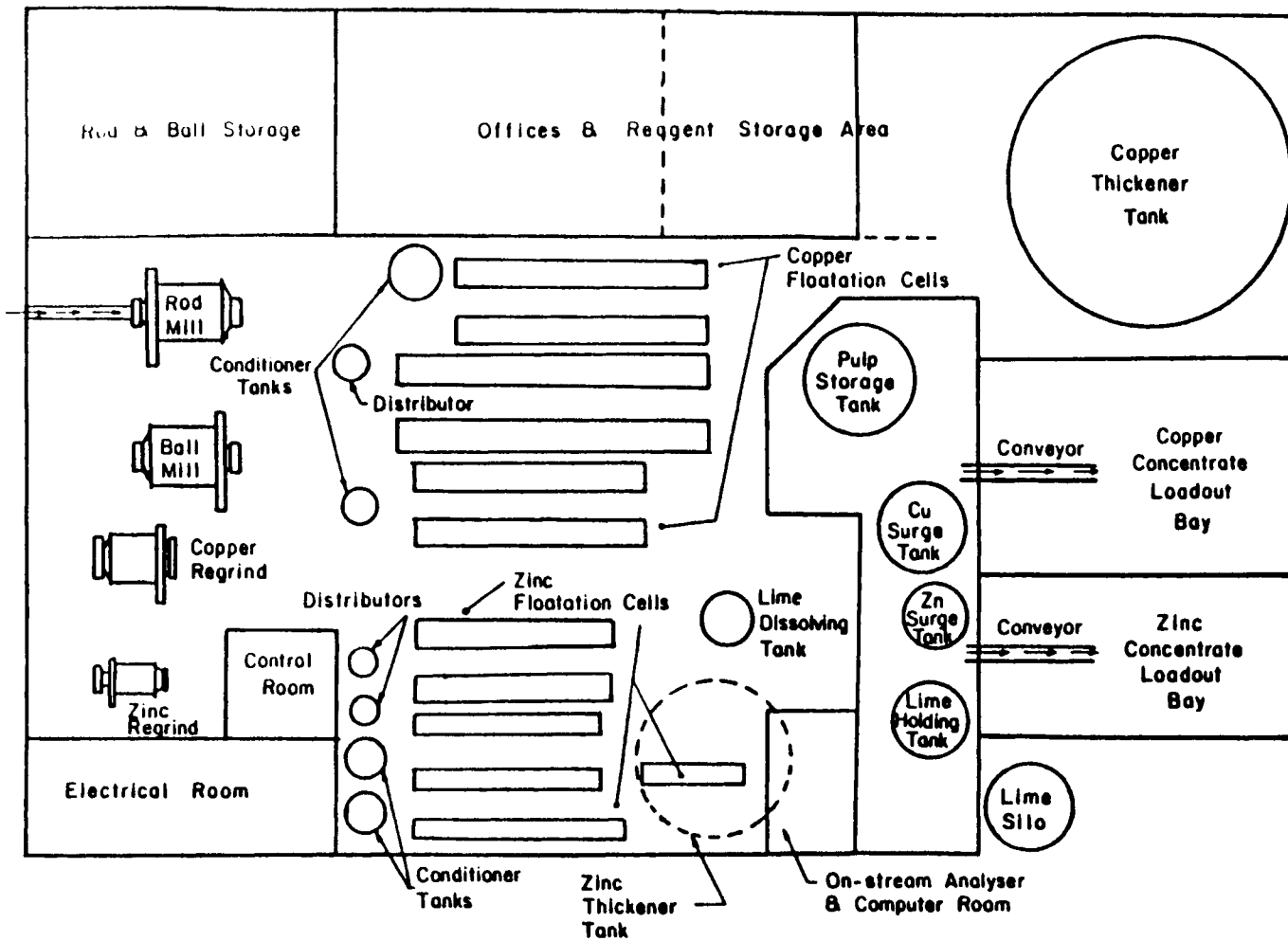
The copper concentrate was trucked under contract to a receiving facility at Revelstoke and loaded into railway gondola cars for shipment to the smelter at Noranda, Quebec.

A general arrangement diagram and a general process flow diagram appear in Figures 3 and 4.

Metallurgy

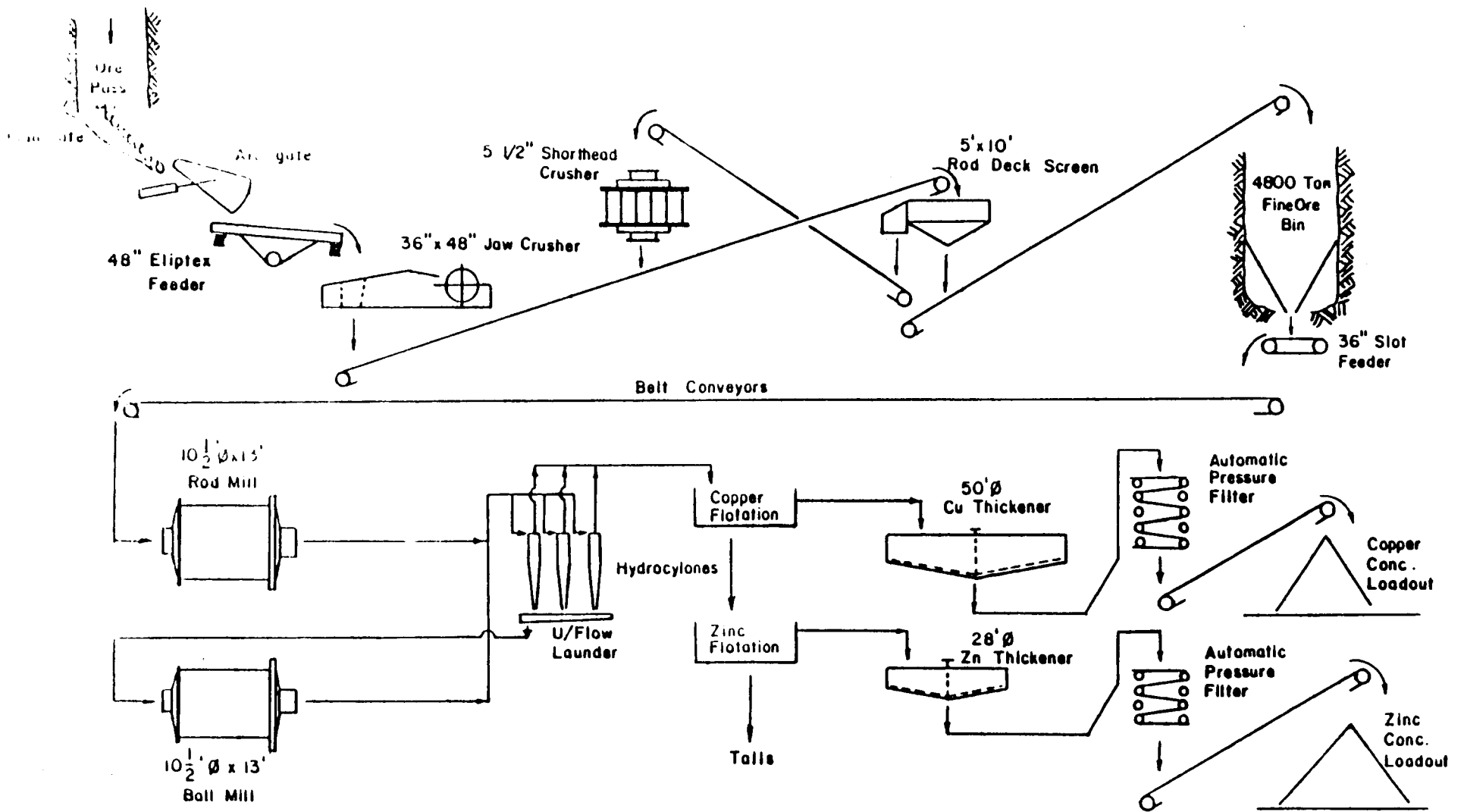
The start-up problems were virtually all resolved at the time of closure. Metallurgical results for copper gradually improved to planned levels. Zinc recovery was hindered by the presence of secondary copper minerals in the upper benches of the open pit. However, significant progress was made towards improving recovery during the latter stages of the operation.

Metallurgical results are tabulated on page 11.



GOLDSTREAM CONCENTRATOR - GENERAL ARRANGEMENT

FIGURE 3



**GOLDSTREAM GENERAL PROCESS
FLOW DIAGRAM**

FIGURE 4

GOLDSTREAM DIVISION
PRODUCTION RESULTS

	<u>1983</u>		<u>1984</u>
	<u>May-Sept.</u>	<u>Oct-Dec.</u>	<u>Jan-Apr.</u>
Tons per day	1305	1376	1440
Grade - % Cu	3.13	3.42	3.40
- % Zn	1.87	2.10	2.15
Recovery - Cu %	86.5	85.6	87.5
- Zn %	1.9	4.3	10.9
Tons Concentrate per Day			
- Copper	166	187	192
- Zinc	1	3	7
Concentrate Grade			
Copper - Cu %	21.8	21.57	22.31
- Ag. oz/ton	1.99	2.05	2.15
Zinc - Zn %	45.94	47.69	47.5

Site Costs (Jan. 1984 - Mar. 1984)

	<u>\$Cdn/ton milled</u>
Mine	\$16.30
Mill	6.17
Plant	4.13
Administration	<u>8.54</u>
Total	\$35.14

Potential for Custom Milling

Within trucking distance of the Goldstream plant, there is great potential for additional mineral discoveries in the Columbia River Valley. The Goldstream location provides one of the few sites, if not the only one north of Revelstoke, for disposal of tailings in an environmentally acceptable fashion.

Projected Operating Plan

A projected operating plan for the remaining ore reserves is shown on page 13.

This plan assumed a capital expenditure program in the first three years of some \$9 million to sink a shaft to the 400 metre level, develop the ore from the bottom of the present workings to the 400 metre level and to construct a backfill plant.

Goldstream Division

Projected Operating Plan With Shaft & Backfill Plant

Year	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
Tons milled (000's)	548	548	548	548	548	548	340
<u>Production</u>							
Lbs. Copper 000's	35,155	39,340	37,610	36,080	36,080	35,980	22,200
Lbs. Zinc 000's	6,229	11,970	11,490	11,050	11,050	11,050	6,800
Ozs. Silver 000's	153	143	143	143	143	143	143
<u>Cost/ton milled (by area)</u>							
Mining	\$17.06	\$20.18	\$20.15	\$20.69	\$20.87	\$19.60	\$18.25
Milling	6.66	6.66	6.66	6.66	6.66	6.66	6.66
Plant	3.55	3.55	3.95	3.55	3.55	3.55	3.55
Administration	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>
Total	36.39	39.51	39.88	40.02	40.20	38.93	37.58
<u>Cost/ton milled (by type)</u>							
Labor	14.40	14.80	14.80	14.80	14.80	14.80	14.80
Materials	18.65	21.47	21.44	21.44	21.44	20.17	18.82
Energy	3.34	3.24	3.24	3.78	3.96	3.96	3.96
Capital and Development (\$000's)	3,197	2,412	3,618	700	600	350	150

Note: Costs are in 1st quarter 1984 Canadian dollars.

Labour And Personnel

The hourly rated workers were represented by the International Union of Operating Engineers, while all professional, technical and clerical staff were non-union.

The operating workforce would be expected to change somewhat as the open pit mining has been completed and the entire ore supply will come from underground.

Feb. 1984 Workforce		Future Workforce	
Staff	Hourly	Staff	Hourly
52	128	52	149

The current collective agreement with the I.U.O.E. expired on March 31, 1985. Wage rates in force during the last year of the agreement were as follows:

Labourer	\$ 9.95/hour (CDN)
+ 1 increment *	\$10.30
+ 2 increments	\$10.65
Operator Level 1	\$11.00
+ 1 increment	\$11.35
+ 2 increments	\$11.70
Operator Level II	\$12.00
+ 1 increment	\$12.35
Operator Level III	\$12.75
First Aid/Dry Attendant	\$12.00
Tool Crib Attendant	\$12.00
Oiler	\$12.00
Drill Doctor	\$12.75
Uncertified Journeyman	\$14.40

* Increments refer to training within the Progression System of Operators.

Benefits available include Life Insurance, A.D & D.I., Weekly Indemnity, Medical Services Plan, Dental Plan and Pension Plan.

There were no labour disruptions of any sort during the operating period of the mine.

Hourly turnover rate in 1983 was 20.4%.

The current Goldstream staff work under the Noranda Group Salary Administration guidelines.

Staff turnover rate in 1983 was 16.8%.

Permanent Closure Plans

The Goldstream division filed a "Reclamation Report" and received a permit to operate from the Ministry of Mines on the basis of fulfilling certain obligations on abandonment or permanent closure. These are as follows:

- Revegetation of mine plant areas
- Seal all openings
- Remove buildings
- Cover foundations etc. for revegetation
- Drain tails pond, grade and revegetate

Licences And Approvals

The following primary Government permits were obtained for the Goldstream operation:

- Reclamation Permit M-147
- Permission to Construct Tails Dam
- Production Permit
- Air Emissions
- Effluent Discharge
- Refuse Disposal
- Water Use Permits
- Water Diversion
- Use of Forestry Road
- Propane Installations
- Numerous Equipment Permits

Goldstream Ore Reserves As Of April 15th, 1984

A. Developed Ore To 655 M Elv.

<u>Location</u>	<u>Total Reserve 1</u>			<u>Mined To Date 2</u>			<u>Remaining Reserve 3</u>		
	<u>Tons</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Tons</u>	<u>% Cu</u>	<u>% Zn</u>	<u>Tons</u>	<u>% Cu</u>	<u>% Zn</u>
Pit (to 860 Elv.)	361,007	4.04	3.13	250,776	3.24	1.88	110,231	3.23	1.84
830 (including sill)	217,767	4.04	3.13	19,618	3.82	2.05	198,149	3.89	1.93
770	391,600	4.20	2.66	23,733	2.88	1.91	367,868	3.64	2.29
715	396,101	3.44	3.01	80,952	3.69	2.92	315,150	4.39	3.87
655	412,665	4.26	3.05	117,580	3.60	2.60	295,084	3.93	3.00
Total Developed	1,779,140	3.99	2.98	492,659	3.41	2.23	1,286,482	3.89	2.75

B. Drill Indicated Ore To 400 M Elv.

655 To 400 M Elv.	2,212,653	3.29	2.35				2,212,653	3.29	2.35
-------------------	-----------	------	------	--	--	--	-----------	------	------

C. Total Developed & Drill Indicated

Pit to 400 M Elv.	3,991,793	3.60	2.63	492,659	3.41	2.23	3,499,135	3.51	2.50
-------------------	-----------	------	------	---------	------	------	-----------	------	------

Notes:

- 1 N.W. Berg, 1983
- 2 Mine Sample Grade Corrected to Mill Head grade
- 3 Grades are Based Sample & Diamond Drill Data Corrected to Mill Head grade

Dilution of 26% at 0.42% Cu and 0.34% Zn.

Cut off grade of 2% Cu

*Take off these
last 2 pages
(duplicates)*

Goldstream Division

Projected Operating Plan With Shaft & Backfill Plant

Year	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
Tons milled (000's)	548	548	548	548	548	548	340
<u>Production</u>							
Lbs. Copper 000's	35,155	39,340	37,610	36,080	36,080	35,980	22,200
Lbs. Zinc 000's	6,229	11,970	11,490	11,050	11,050	11,050	6,800
Ozs. Silver 000's	153	143	143	143	143	143	143
<u>Cost/ton milled (by area)</u>							
Mining	\$17.06	\$20.18	\$20.15	\$20.69	\$20.87	\$19.60	\$18.25
Milling	6.66	6.66	6.66	6.66	6.66	6.66	6.66
Plant	3.55	3.55	3.95	3.55	3.55	3.55	3.55
Administration	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>	<u>9.12</u>
Total	36.39	39.51	39.88	40.02	40.20	38.93	37.58
<u>Cost/ton milled (by type)</u>							
Labor	14.40	14.80	14.80	14.80	14.80	14.80	14.80
Materials	18.65	21.47	21.44	21.44	21.44	20.17	18.82
Energy	3.34	3.24	3.24	3.78	3.96	3.96	3.96
Capital and Development (\$000's)	3,197	2,412	3,618	700	600	350	150

Note: Costs are in 1st quarter 1984 Canadian dollars.