

825889

MINNOVA Inc.

MEMORANDUM

1041K

DATE: March 21, 1988
A
TO: D.H. Watkins
COPIES A
COPIES TO: J. Purkis
DE
FROM: A.J. Davidson
SUJET
SUBJECT: NORTH AMERICAN METALS - GOLDEN BEAR PROPERTY

SUMMARY

COMPANY - North American Metals
- 8 million shares outstanding at \$4.00

PRINCIPAL ASSET - 50% interest in Golden Bear deposit with Chevron
Canada

LOCATION - Northwestern B.C., 93km by road (to be built) from
Telegraph Creek.

RESERVES - 625,000 tonnes at 18.6g/T Au
including: 320,000 tonnes @ 16.37g/T Au - open pit
304,000 tonnes @ 20.94g/T Au - underground

PROJECTED CAPITAL COSTS - \$40 million

PROJECTED OPERATING COSTS - \$110/tonnes

EXPLORATION POTENTIAL - Poor to increase known mineable deposit
- Good to find additional lenses/shoots.

ENVIRONMENTAL - AIP approved for all except air emissions and lake
tailings disposal.

ECONOMICS - \$22 million NPV at DCF of 10%.
\$15 million NPV at DCF of 15.

CONCLUSION - On project basis - No, we can find more for \$60 million
(\$40 million takeover + \$20 million in capital cost)
ourselves.

ORE RESERVES

Ore reserves on the property are presently estimated at 625,000 tonnes grading 18.6 g/T Au. This reserve is broken down as follows:

Open pit - 321,252 tonnes @ 16.37 g/T Au

Underground - 304,138 tonnes @ 20.94 g/T Au

About 50 holes, 12 crosscuts and 6 trenches have been used to define the ore reserves. Two blocks (underground) each totalling 12,000 tonnes have only been defined by one hole each. The other 8 underground blocks are based on 2-6 holes and 1-3 crosscuts each. The pit blocks are based on 2-6 holes each. Maximum block size underground is 70,000 tonnes and maximum pit block is 30,000 tonnes. In general the ore reserves seem good and the drill hole results have been confirmed by both the x-cut sampling the muck samples from the c-cuts and from a small test stope. Unfortunately ore in the pit is zoned roughly from low grade (7-15 g/T Au) at the top to higher grade (15-22 g/T Au) at deeper levels. Since mining in the pit will necessarily start at the top the higher grade pit ore will not be available until the third year of production. This has a severe affect on payback, NPV and cash flow.

Based on the 50 drillholes, 12 x-cuts etc a block-model was developed by A.M.S. of Denver. The reserves were then calculated from this model of 6.5m c 6m blocks of ore. The data points (holes and crosscuts) are variable but are generally 12.5-37m apart.

No external dilution has been factored into the ore reserves. This is because N.A.M. say that the hangingwall contact is extremely sharp and represented by the transition of soft fault gouge to competent bleached tuffs. They say that the rocks do not appear to be under stress and that no overbreaking has been experienced in either their x-cuts or their one test stope. The footwall contact is an assay cutoff so no dilution is necessary!

INTRODUCTION

Following a \$4.00 / share takeover offer of North American Metals by Homestake, North American has been inviting other companies to review their principle asset - the Golden Bear/Muddy Lake property in Northwestern B.C. With the aim of finding someone willing to pay a higher dollar. John Purkis and I reviewed the data from the property in N.A.M's offices on March 18, 1988.

THE COMPANY

N.A.M. currently have 8 million shares outstanding (fully diluted). A few directors control about 10-15% of the stock. Principle directors are Bob Hunter (Lincoln/Breakwater) and Bob Dickenson . Assets of the company are:

- a) a 50% working interest in the Golden Bear JV (with Chevron).
- b) a 30% interest in Steelhead Resources Ltd. which has the right to purchase a 100% interest in the Excelsior Au-Ag property near Bellingham W.A.
- c) a 25% working interest in the Seal River gold project near Churchill Manitoba.

The company's principle asset in its interest in Golden Bear.

THE PROPERTY

The Golden Bear/Muddy Lake property is located 80km northwest of Telegraph Creek in northern B.C. on the east side of the Coast Mountains. A 93km road is presently being constructed to access the property from Telegraph Creek. Cost of the road is presently estimated at \$9.2 million based on a fixed contract for about 85% of the items. Approvals have been received for the road and work is underway.

GEOLOGY

The Golden Bear deposit occurs along a major structure at the contact between a dolomite unit to the west and as tuff to the east. A quartz-dolomite breccia, a pyritic tuff and a strong fault gouge have been developed as a result of this structure and it is these three units that host the Au mineralization. The sequence of units from hangingwall to footwall is fault gouge to pyritic tuff to quartz breccia. The richest ore is in the fault gouge and the pyritic tuff.

The ore zone dips steeply east and the hangingwall contact is both sharp and marked by mineralized gouge. The footwall contact into the dolomite is an assay contact and test holes will be necessary to define the 3.0 g/T cutoff.

The ore zone has a strike length of about 500m, a dip extent of 100-150m and a thickness of 3-10m.

MINING METHOD

N.A.M. and A.M.S. have decided to mine the deposit by cut-and-fill methods. Stopes will be 25m long by the width of the orebody (in 2-3 slices) by 6m high. Long holing was considered but abandoned because of very poor ground conditions in the ore. Fill will be pumped up the hill from the mill and mixed with 4% cement. All development will be in the dolomite footwall which apparently is good ground. The main haulage is the 1360m elevation which is below the landslide rubble. Development will be tracked and ore from both the pit and from underground will be moved to the 1360, trammed to the portal and skipped down the hill on a railed skip. There seems to be a conscious effort being made not to over-build and to keep openings small.

Mining costs are estimated at \$50 / tonne (combined open pit and underground). The pit will operate for 4 months of the year and underground all year. Feed will be 60% underground and 40% mill for a total of 115,000 T / year.

MILLING

Ore, shipped to the mill, will be crushed to -35 mesh then roasted. The calcine product will be subjected to a CIP process a la Lac Shortt. Recoveries now are about 87% (not 93%) but can be improved to 90% with the installation of a regrind circuit (an extra \$600,000 in capital costs). Tailings disposal will be on land until a permit can be acquired for direct disposal into Muddy Lake. Capital costs for the mill etc. are expected to be \$7,000,000. The mill design etc. was done by Melis and is by far the most comprehensive part of the feasibility study. According to Franzen, Wright Engineers were "simply terrible" he finally even had to take the typing of the feasibility report away from them. He strongly recommends avoiding Wright Engineering. Milling costs are expected to be \$50-60 / tonne. Approval in Principle has been received for all aspects of the project except lake tailing's disposal and air emissions. The government will wait to see how bad the emissions are before setting the standards.

CAPITAL COSTS

Capital costs are expected to be about \$40 million including the road. A contingency of about 10% has been built in. John Purkis has more detail on the capital costs and the reliability of their estimates.

EXPLORATION POTENTIAL

The potential for discovering more ore at Golden Bear is very analogous to that at Samatosum. That is, there is little potential to add tonnes to the known orebody but there is good potential to discover new lenses or ore shoots both down dip and along strike. In fact disseminated and patchy mineralization extends along strike for an extra 200m. This mineralization is located on the footwall to (lower grade side) and internal to the quartz breccia and overall is lower grade and more erratic than the main hangingwall pyritic zones.

Also virtually no drilling has been done below the 1300m elevation or between Bear and Fleece.

The Fleece zone is located about 1.5km north of the Bear zone along the same structure. The Fleece ore appears in a sliver of volcanics in limestone, is analogous to the quartz breccia ore at Bear ie lower grade and erratic. The Fleece zone is 500m strike by 150m dip by 1.5 to 4m thick. The published inventory is as follows:

<u>Zone</u>	<u>Tons</u>	<u>Au (opt)</u>	<u>Cutoff (opt)</u>
A	304,000	.23	.1
B	62,000	.31	.2
C	173,000	.15	.1
Dyke	32,000	.61	.2

The zone does not outcrop and is thin and erratic ie one intersection/section and not consistent. However with sufficient underground exploration a reserve of maybe 500,000 tonnes of low grade could be developed.

The Totem zone is 3-5km north of Fleece and consists of about 25 holes of which about 7 have hit values of 1-2 g/T Au over width of 1-3m. Best intersection is 6.1 g/T Au / 4.5m.

The structure persists off the property to the north onto Chevron - Lightning Creek Mines (J. Dupuis) JV ground.

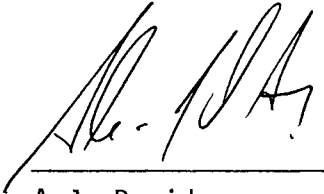
ECONOMICS

A cash flow summary at Gold = \$400 US is attached. Recoveries shown here are at 93-94%. Anticipated recovery though is only 90%. The attached scenario shows a 1988 startup. The most optimistic startup now is mid 1989. On a DCF basis the project is shown (as attached) to have an NPV at 10% of \$22 million or at 15% of \$15 million. NAM's share would be \$11 million and 7.5 million respectively. Total cash flow from the project (undiscounted) would be \$83 million less capital cost of \$38 million = \$45 million (NAM share \$41.5m - \$19m = \$22.5m). The project makes good economic sense from NAM's or Chevron's point of

view. On a purely project basis the project does not make sense if one has to first take over NAM at 4.50-5.00/share (\$36 million to \$40 million) plus another \$20 million to put the thing into production ie \$60 million for a 50% share in a project with a total NPV of 15-22 million.

CONCLUSIONS

A better project than I had thought but not for Minnova. We have a philosophy of massive sulphides and gold near available infrastructure. This project does not meet these criteria. Minnova can do better by spending the \$40 million (take over) or \$60 million (takeover and capital cost) on its own exploration or by buying into something better situated and less capital intensive.



A.J. Davidson

AJD:sv

GOLDEN BEAR GEOLOGY

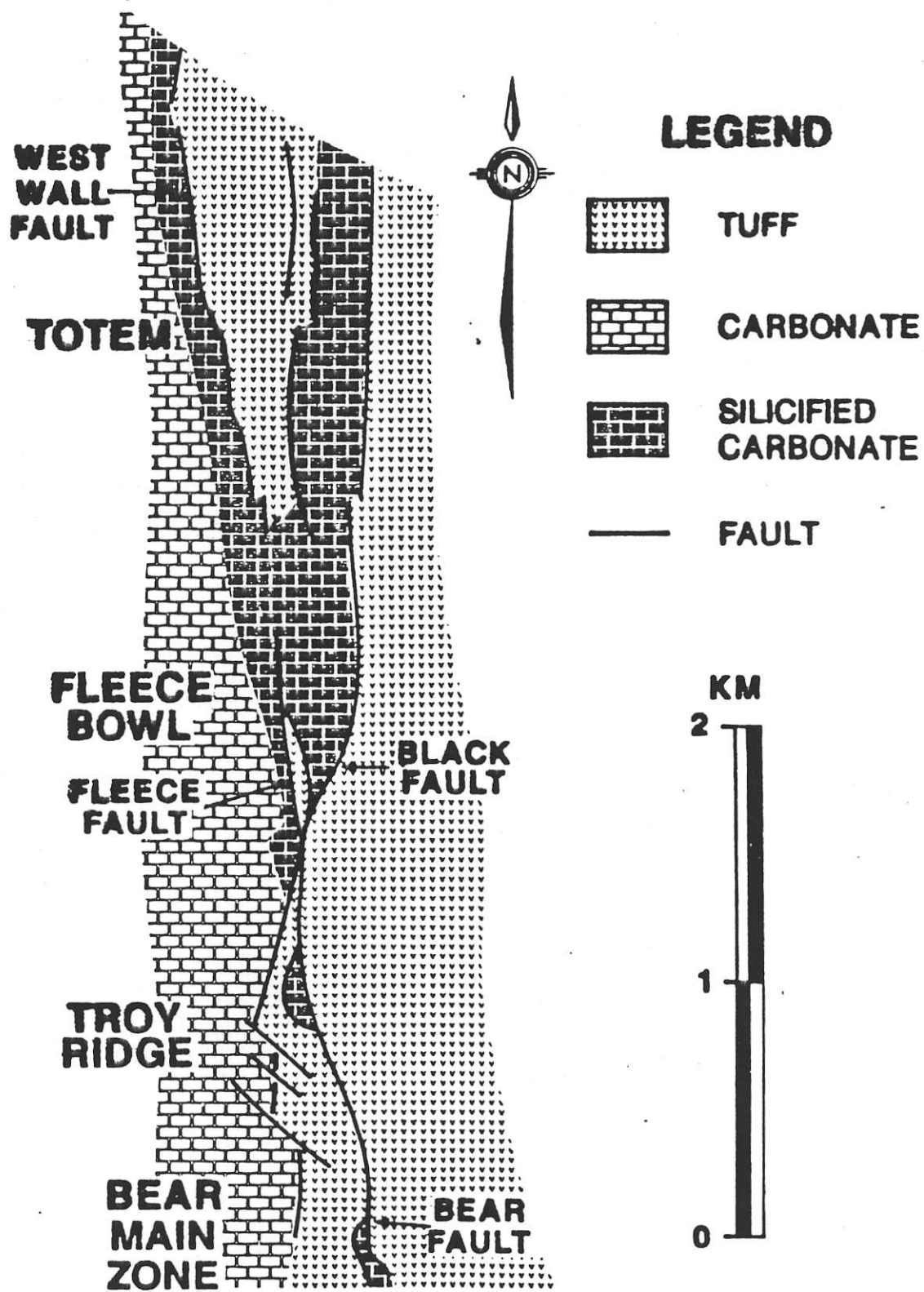
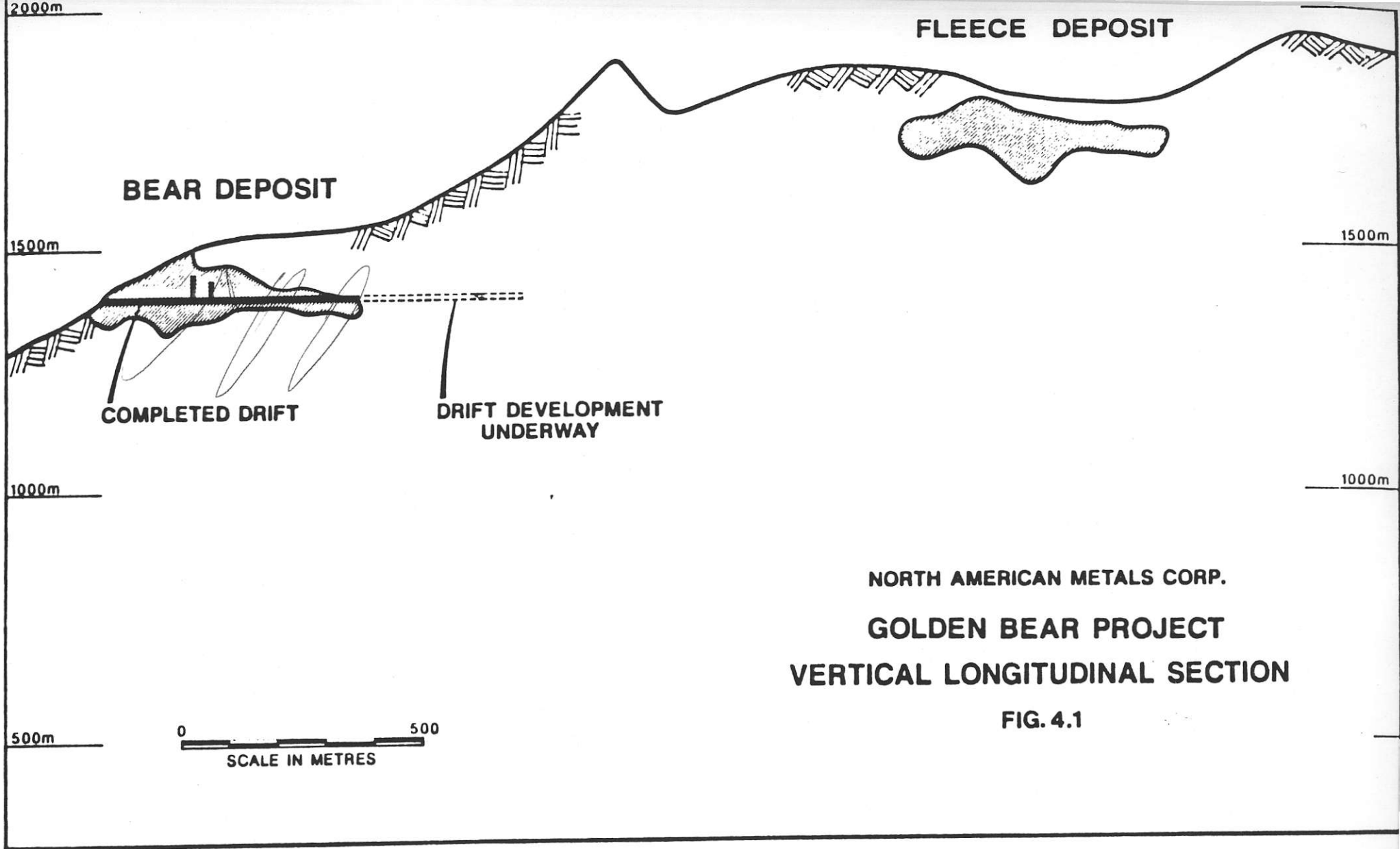


Fig. 4.2



NORTH AMERICAN METALS CORP.
GOLDEN BEAR PROJECT
VERTICAL LONGITUDINAL SECTION

FIG. 4.1

4-3

SECTION 5

SECTION 6

SECTION 7

SECTION 8

NORTH AMERICAN METALS CORP.
GOLDEN BEAR PROJECT
BEAR DEPOSIT
 1400m LEVEL PLAN

BY: J.P.F./rwr

JAN., 1987

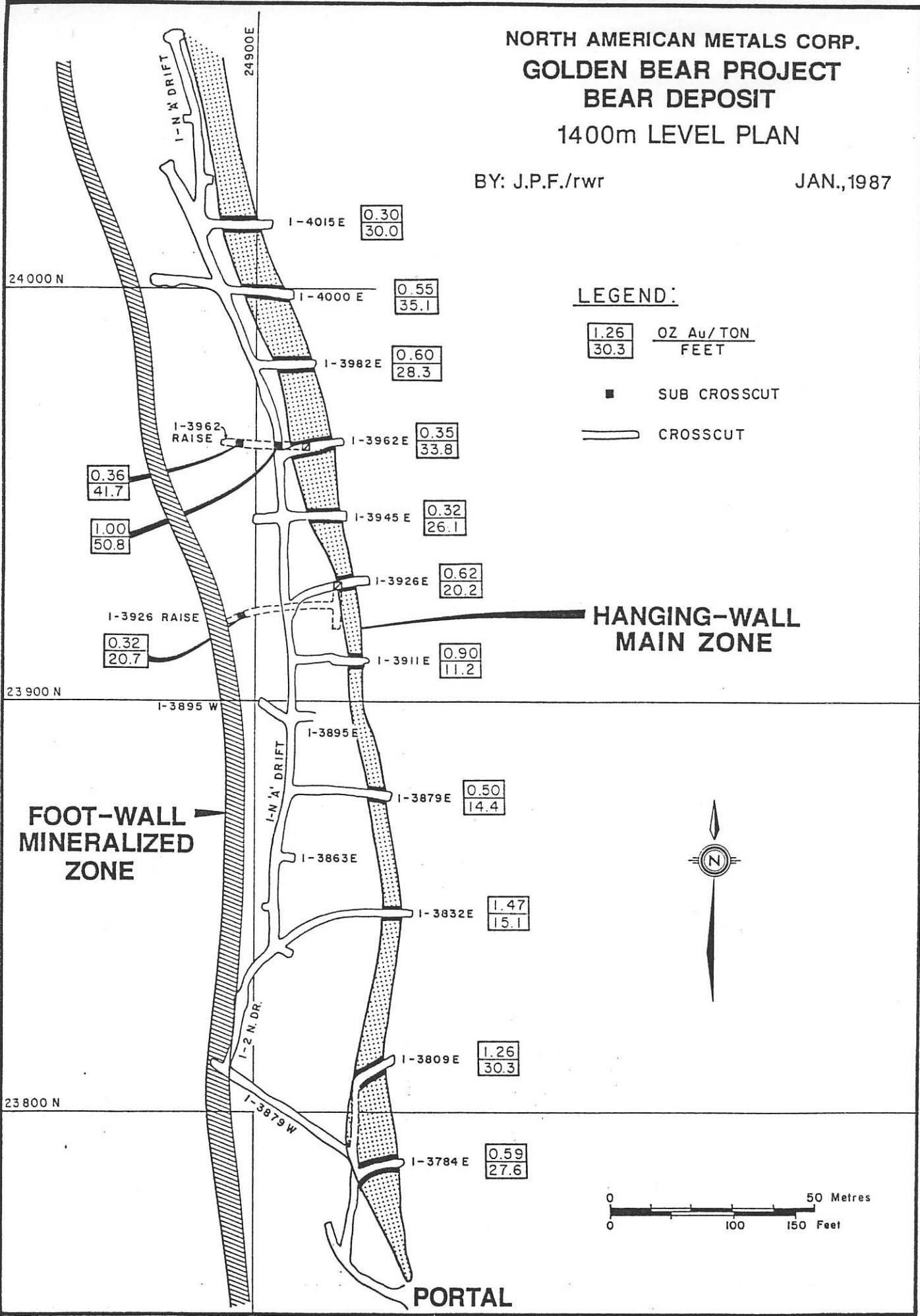


TABLE 5.5

GOLDEN BEAR JOINT VENTURE - PRODUCTION DATA

UNDERGROUND

UNDERGROUND LOCATION (ORE ZONE)	TOTAL TONNES	GRAMS AU/ TONNE	AVERAGE SLOPE WIDTH	TONNES SANDFILL @ 47.00 % OF TOTAL TONNES	NUMBER SLOT RAISES REQUIRED	TONNES ORE PER SLOT RAISE TONNE	TONNES ORE/ SHIFT	TONNES SANDFILL /SHIFT	TOTAL SHIFTS ORE	TOTAL SHIFTS SANDFILL	TOTAL SHIFTS SLOT RAISES	TOTAL SET SHIFTS	TOTAL SHIFTS REQUIRED	AVERAGE TONNES PER SHIFT	AVE TONNES PER CREW SHIFT	ORE CREW MANNING	SANDFILL CREW MANNING	PRODUCTION MAN-SHIFTS REQUIRED	SANDFILL MAN-SHIFTS REQUIRED	ORE TONN PER MANSHIP	
1300																					
6H, 7H, 8H, 1XC	1301	23,678	18.85	5.07	11,128	16	21.11	94.43	206.32	250.74	53.94	25.44	64	394.12	60.08	71.72	2	3	552.37	161.81	33.
1302	28,883	20.51	4.61	13,575	16	25.75	94.43	206.32	305.87	65.80	25.44	64	461.10	62.64	72.73	2	3	662.61	197.39	33.	
1303	23,789	22.16	2.02	11,181	16	21.21	69.01	162.8	344.72	68.68	25.44	64	502.84	47.31	54.21	2	3	740.32	206.03	25.	
6H, 7H, 8H, 1XC	1304	31,414	37.33	4.29	14,765	16	28.01	84.31	188.34	372.60	78.39	25.44	64	540.44	58.13	65.94	2	3	796.09	235.18	30.
1305	12,247	14.35	4.85	5,756	16	10.92	94.43	206.32	129.69	27.90	25.44	64	247.03	49.58	68.91	2	3	310.27	83.70	31.	
1306	12,469	16.30	2.79	5,860	24	7.41	69.01	162.8	180.68	36.00	38.16	96	350.84	35.54	48.93	2	3	437.69	107.99	72.	
6H, 7H, 8H, 1XC	1401	56,897	26.08	8.96	26,742	24	33.82	84.31	188.34	674.86	141.99	38.16	96	951.00	59.83	66.55	2	3	1426.03	425.96	0.
6H, 7H, 8H, 1XC	1402	69,957	18.80	10.28	32,880			84.31	188.34	829.76	174.58		1004.34	69.65	69.65	2	3	1659.52	523.73	32.	
1403	32,624	10.12	4.94	15,333	15	31.03	94.43	206.32	345.48	74.32	23.85	96	539.65	60.45	73.54	2	3	738.66	222.95	33.	
1461	12,180	9.87	5.26	5,725	15	11.58	84.31	188.34	144.47	30.40	23.85	6	204.72	59.50	61.30	2	3	338.64	91.19	28.	
TOTALS	304,138	20.94	6.59	142,945					3,579	752	251	614	5,196								

OPEN PIT

OPEN PIT BENCH ELEVATION	ORE TONNES	ORE GMS/TONNE	LOW GRADE WASTE TONNES	LOW GRADE WASTE GRMS/TONNE	ROCK WASTE TONNES	RUBBLE WASTE TONNES	TOTAL WASTE TONNES	TONNES HI GRADE PER DAY	TONNES LOW GRADE PER DAY	TONNES ROCK WASTE PER DAY	TONNES RUBBLE PER DAY	TOTAL DAYS ORE	TOTAL DAYS LOW GRADE	TOTAL DAYS WASTE	TOTAL DAYS RUBBLE
1543						55	55	700	258	770	3,600				0
1537						4,155	4,155	700	258	770	3,600				1
1531						6,952	6,952	700	258	770	3,600				2
1525						10,222	10,222	700	258	770	3,600				3
1519						17,300	17,300	700	258	770	3,600				5
1513						28,517	28,517	700	258	770	3,600				8
1507						37,902	37,902	700	258	770	3,600				11
1501	380.16	15.32			418	58,584	59,002	700	258	770	3,600	1		1	16
1495	3168.00	12.35			3,485	73,017	76,502	700	258	770	3,600	5		5	20
1489	4278.78	9.36			4,707	80,005	84,712	700	258	770	3,600	6		6	22
1483	7092.36	9.44	594.00	3.49	7,802	88,097	95,899	700	258	770	3,600	10	2	10	24
1477	9240.66	10.71	1480.05	3.38	10,165	95,330	105,495	700	258	770	3,600	13	6	13	26
1471	10393.02	8.48	1589.94	4.08	11,432	101,803	113,235	700	258	770	3,600	15	6	15	28
1465	14348.00	7.66	792.00	4.06	15,783	101,161	116,944	700	258	770	3,600	20	3	20	28
1459	12967.00	7.82	3890.70	4.41	14,264	107,102	121,366	700	258	770	3,600	19	15	19	30
1453	15635.00	9.53	6138.00	4.00	17,199	103,756	120,954	700	258	770	3,600	22	24	22	29
1447	15515.00	10.59	8490.24	3.77	17,067	110,257	127,324	700	258	770	3,600	22	33	22	31
1441	20644.00	14.39	10618.08	4.14	22,708	107,296	130,004	700	258	770	3,600	29	41	29	30
1435	27883.00	15.52	9220.86	4.37	30,671	98,984	127,655	700	258	770	3,600	40	35	40	27
1429	28949.00	18.37	7714.74	4.14	31,844	93,541	125,385	700	258	770	3,600	41	30	41	26
1423	30686.00	20.73	6490.77	4.02	33,755	84,841	118,595	700	258	770	3,600	44	25	44	24
1417	29456.00	19.72	10015.00	4.23	32,402	76,156	108,558	700	258	770	3,600	42	39	42	21
1411	22776.00	21.94	13470.00	4.43	25,054	71,826	96,880	700	258	770	3,600	33	52	33	20
1405	18767.00	22.41	13738.00	4.38	20,864	55,722	76,586	700	258	770	3,600	27	53	27	15
1399	13230.03	25.37	11318.00	4.35	14,553	39,945	54,498	700	258	770	3,600	19	44	19	11
1393	13361.70	23.34	8988.87	4.19	14,698	19,463	34,161	700	258	770	3,600	19	35	19	5
1387	16268.34	15.21	3460.71	4.05	16,268	1,155	17,423	700	258	770	3,600	23	13	21	0
1381	6012.60	16.06	230.67	3.93	6,013	728	6,741	700	258	770	3,600	9	1	8	0
TOTALS	321,252	16.37	118,241	4.20	351,149	1,671,873	2,023,021					459	459	456	464

BEAR MAIN ZONE IDEALIZED CROSS SECTION

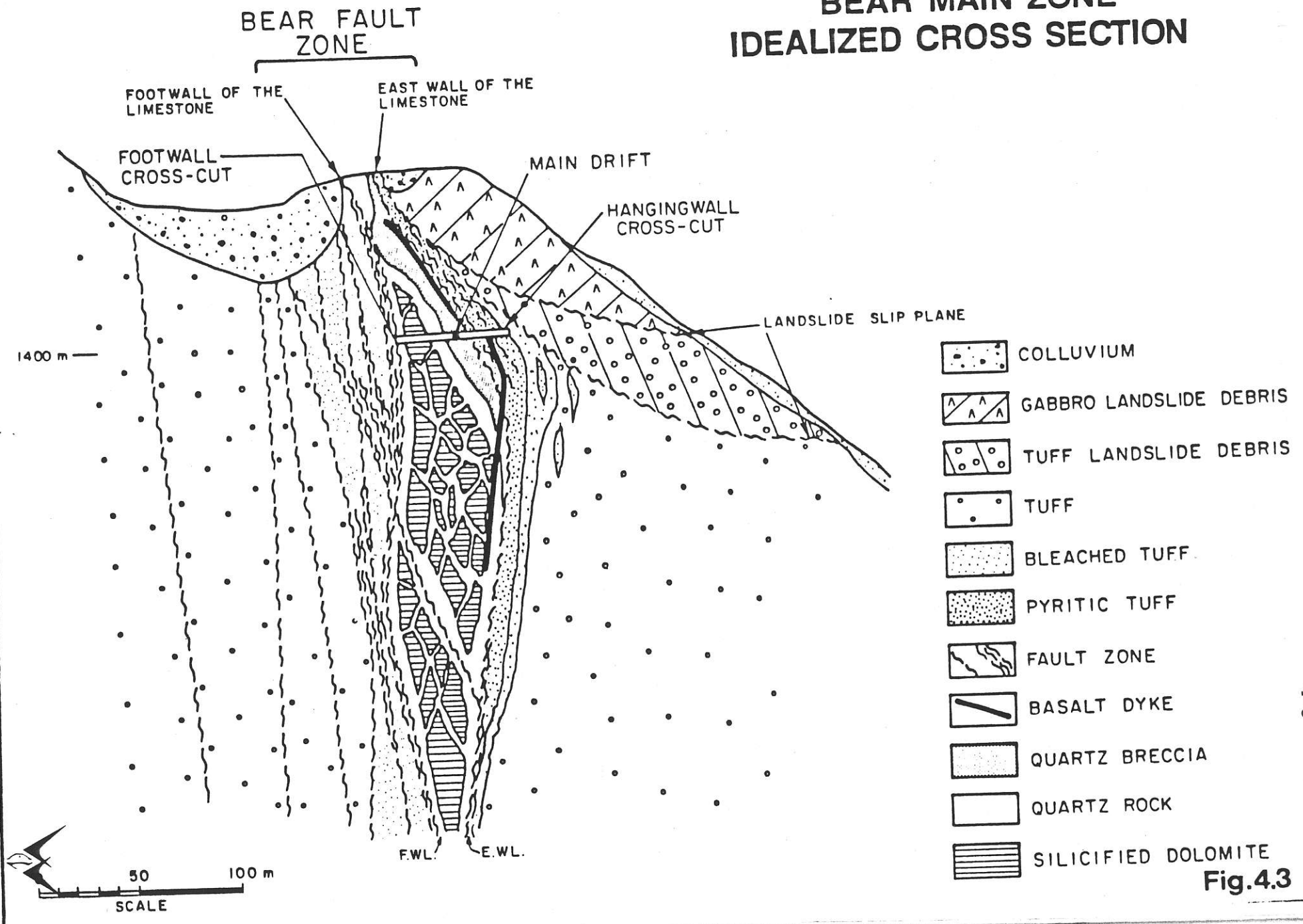


Fig.4.3