

GM 55774

ECONOMIC FEASIBILITY STUDY OF THE NORANDA AREA BASE METAL PROPERTIES

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Economic Feasibility Study
of the
Noranda Area Base Metal Properties
of
Deak Resources Corporation

MRN - GÉOINFORMATION

1998

GM 55774

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Economic Feasibility Study
of the
Noranda Area Base Metal Properties
of
Deak Resources Corporation

I INTRODUCTION

The authors of this study were commissioned by Deak Resources Corporation ("Deak") to report on the economic feasibility of placing into production three base metal properties in the Noranda area, Quebec, Canada. The individual responsibilities of the authors are:

Norman Lecuyer, P. Eng.	- Mining
Kenneth Hester, P. Eng.	- Metallurgy
Donald Esson, P. Eng.	- Geology/Ore Reserves

The Reports of Messrs. Lecuyer & Esson are consolidated herein, while that of Mr. Hester is bound separately.

The subject properties and ores are:

West MacDonald	- zinc and precious metals
Iso Magusi	- zinc and precious metals
Hebecourt (New InSCO)	- copper

These base metal ores are to be processed in the Deak - controlled former Kerr Addison mill near Virginiatown, Ontario. This mill will also be designed to process gold ores in a parallel circuit.

All three of the properties have been subject to extensive exploration and two of them have been in production. The authors examined much of the data on earlier work, paying particular attention to that of more recent date.

II LOCATION, ACCESS, LOCAL SERVICES

All three of the Deak base-metal properties are located in the area of the Rouyn/Noranda mining camp in northwestern Quebec, (See attached location map). Each property is accessible by gravel all-weather roads connecting to paved highways. It is proposed that the Hebecourt-Magusi properties would truck over all-weather logging roads to the Virginiatown mill, alternatively paved highways could be utilized. Distances to the proposed mill are:

- West MacDonald - miles via paved roads
- Iso-Magusi & Hebecourt - miles via paved roads
- or miles via logging roads

Power from the Hydro Quebec grid is on site at West MacDonald but would require construction of 15 and 20 km of line for the Hebecourt and Magusi mines respectively.

Water supply is ample at all sites from local rivers and lakes.

Situated within driving distance of the Rouyn/Noranda mining centre, maximum distance being about 25 miles by road, there is an abundant supply of labour, parts and machinery.

The physiography is typical of the Precambrian shield of northwestern Quebec with gently rolling topography. Maximum elevation changes would be in the order of a few hundred feet. Lake, rivers and muskeg are the main deterrents to travel.

III GEOLOGICAL SETTING, REGIONAL

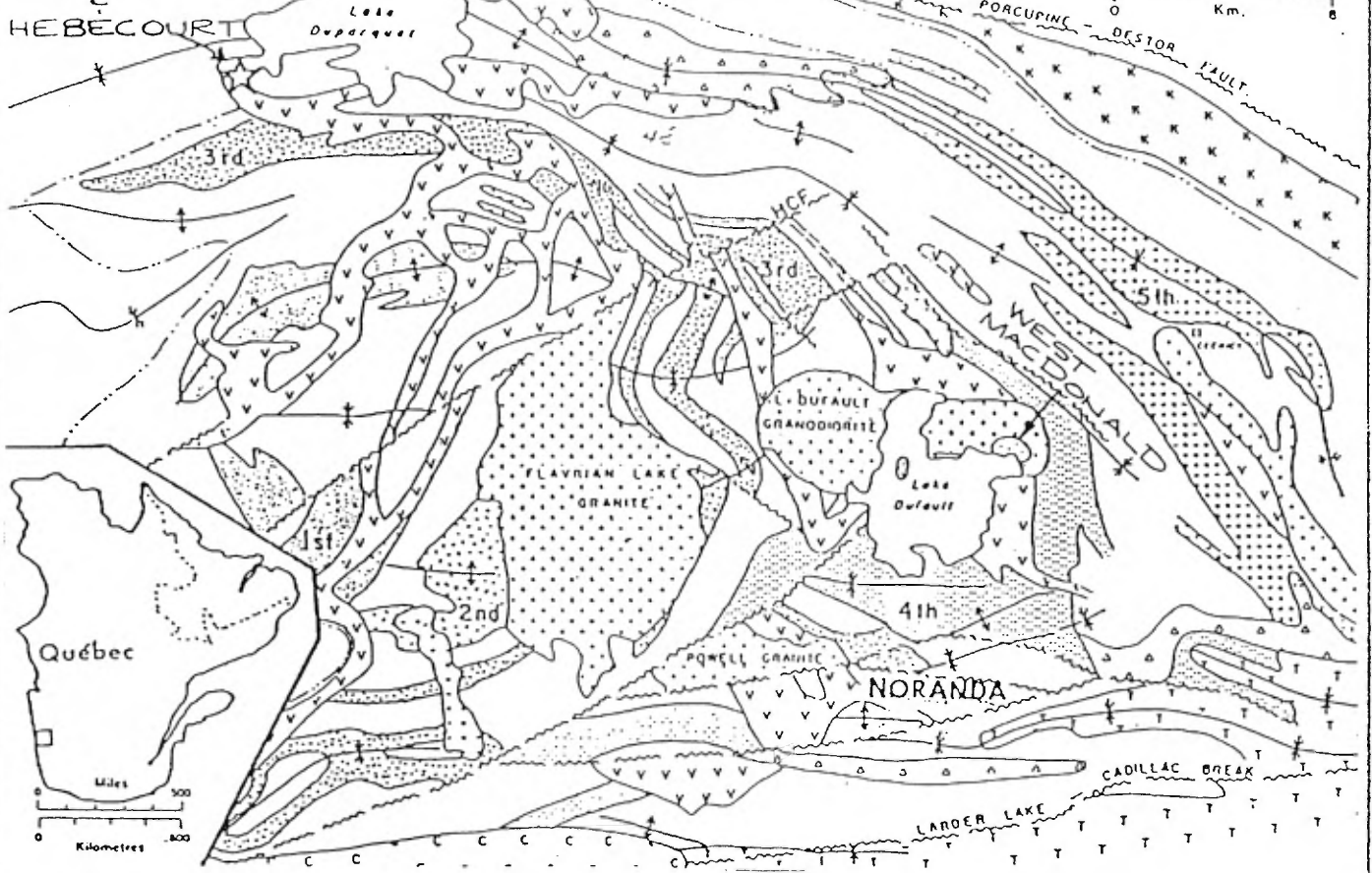
All three of the deposits lie within the Abitibi greenstone belt, the largest and most continuous tectonic unit in the Canadian shield, as well as one of the more prolific hosts of volcanogenic-related base metal and gold deposits. These three deposits are hosted by volcanics of the Blake River Group, also host to other ore deposits within the Noranda complex. The Blake River Group is bounded on the north and south by major structural discontinuities known respectively as the Porcupine-Destor Break and the Larder Lake-Cadillac Break.

In overall appearance the Noranda district has the domal structure of a submarine shield volcanic complex, centrally developed around a remnant magma chamber represented by the Flavrian and Lake Dufault plutons and built up by felsic, intermediate and mafic flows and pyroclastic rocks. In the central portion of the area felsic volcanic rocks occur in roughly equal proportions to mafic members, but decrease in abundance to the north, east and west. The volcanics and associated metagabbros are intruded by three large granitic bodies of Archean age; the Flavrian and Powell plutons and the Lake Dufault granodiorite. Post-dating these igneous events are a swarm of northerly trending Proterozoic (Keweenawan) diabase dikes, lamprophyres and conglomeratic sediments of the Cobalt series.

Regional metamorphism is of lower greenschist grade and therefore the original volcanic textures and fibres are often well-preserved. Rock identification in the vicinity of ore deposits is quite difficult due to strong alteration effects such as silicification and chloritization.

Structural geology of the area is complex with extensive faulting and folding rendering stratigraphic interpretation difficult.

MAGUSI
HEBECOURT



LEGEND

- PROTEROZOIC**
- COBALT GROUP.
- CC Sediments.
- Unconformity
- ARCHEAN**
- Syenite.
- TEMISKAMING GROUP.
- TT Sediments.
- Unconformity
- Granite
- Diorite
- BLAKE RIVER GROUP**
- 5th. Zone
- 4th. Zone
- 3rd. Zone
- 2nd. Zone
- 1st. Zone
- Rhyolite subgroups
- Andesite, Basalt
- Tuff & Agglomerate.
- KEEWAGAMA GROUP
- KK Sediments.
- Faults
- Fault axes

DEAK RESOURCES CORPORATION	
Report on Base Metal Properties	
GENERAL GEOLOGY of the Noranda Mining District	
April/90	by: D.W. Esson

IV WEST MacDONALD PROPERTY

IV - 1 Claims and Ownership

The West MacDonald claims are comprised of Mining Concessions numbers 398 Block 185, 359 Block 177, and part of 354, encompassing some 380 hectares (940.35 acres) in Dufresnoy Twp. Quebec. Deak Resources has the right to obtain a 100% ownership of the property subject to a 15% net profit royalty held by Noranda Exploration Company Limited.

IV - 2 Property Geology and History

IV - 2.1 Geology

The MacDonald zinc deposit is hosted by a volcanic breccia (feldspar porphyry breccia) that is oval in plan measuring 6000 ft. NW - SE and 3000 ft. across. It is completely contained within the Lake Dufault granodiorite pluton.

There are three massive sulphide bodies, all occurring in the north part of the breccia zone, at or near its contact with granodiorite. The largest of the bodies outcrops on surface, where it is elliptical in shape with a maximum length of 900 feet and a width of 350 feet. The zone tapers with depth and bottoms at about 450 feet below surface. It contains the bulk of ore reserves.

Adjacent to the south side of the main sulphide body is a second zone of massive sulphide, which may be locally connected to the main sulphide mass. It is about 200 feet long and up to 75 feet wide and tops about 175 feet below surface. It extends to a greater depth than the main sulphide body decreasing in size with depth, containing lower zinc values. This sulphide body contains C-Zone.

A third massive sulphide zone occurs at depth about 500 feet below the other two. It tops about 850 feet below surface and extends to a depth of 1,200 feet. This zone contains a small zinc orebody, know as Lower Zone.

Only a part of the massive sulphides contain sufficient zinc and precious metal to be considered ore. There are 3 main ore zones known as Main (or A) Zone, C-Zone and D-Zone. The Main Zone contains the bulk of ore reserves mainly in the open pit area. C and D-Zones are underground zones which are separate from the open pit.

IV - 2.2 History

The first work on this property was done by Nipissing Mines Limited prior to 1929.

Trenching, geological mapping and 5000 feet of diamond drilling were done by Bay Consolidated Mines Limited from 1929 to 1936.

During the period 1936 to 1950 MacDonald Mines Limited held the property and completed a total of 176,404 feet of diamond drilling. They sank a three-compartment shaft to 950 feet, and did lateral development on the 325 and 925 foot levels.

Noranda Mines Limited completed 50,131 feet of diamond drilling from 1950 to 1953, under an agreement with MacDonald Mines Limited.

The property was held by West MacDonald Mines Limited from 1953 to 1962, a company formed by Noranda Mines Limited (51% interest) and MacDonald Mines Limited (49% interest). The property was in production from September 1955 to January 1959, producing a total of 1,045,753 tons of ore with a recovered grade of 0.015% Cu, 3.03% Zn, 0.053 Oz./T Ag, and 0.002 Oz./T Au.

In 1962 the name of the company was changed to Brynnor Mines Limited. A total of 9,770 feet of diamond drilling was done by this company.

In 1976 Noranda Exploration Company Limited completed 8,806 feet of diamond drilling in four holes to test the extension of the sulphide zones at depth.

In 1977 the name of the company was changed to Les Mines Gallen Limitee, owned as to 51% by Noranda and 49% by MacDonald Mines Exploration Ltd. Production commenced by open pit in 1981 and continued to 1985. During this period some 754,088 tons were extracted grading 5.50% Zn, 0.88 o.p.t. Ag and 0.04 o.p.t. Au. The open pit was completed to bench 2, leaving benches 3-6 intact.

IV - 3 Ore Reserves

IV - 3.1 Previous Reports and Methodology

The reference section of this report notes the number of recent reports completed, mainly by Noranda technical personnel, on the property and ore reserves. Only those reports later than 1985 reflect the ore removed by open pit.

The writer, having perused all the reference material, concluded that the Noranda Report of 1985 on underground reserves was the most authoritative on that subject.

The underground Proven Ore Reserves that are, essentially, extensions of the open pit were checked and accepted from the open pit ore reserve polygons.

The C and D Zone underground reserves were re-calculated by the writer using vertical cross sections at 25 ft. intervals (horizontal) utilizing all diamond drill holes both from surface and underground.

Grades and widths were re-calculated, weighted and re-averaged by computer. Ore blocks were drawn geometrically and average grades calculated manually. This re-calculation resulted in some minor differences in tonnage and grades from the Noranda studies.

Many of the earlier drill holes from surface and underground did not include assays for silver and gold. The writer therefore used the grade of ore produced by open pit for silver and gold values, being 0.88 opt and 0.04 opt. respectively for the undiluted grade of the underground reserves.

The calculation sheets and Polygon Bench Plans, Benches 3 to 6 as prepared by Norcomp (Noranda Computer), were accepted as the best source for the open pit reserves. Drill hole logs for the original drilling were used to check and confirm the drill hole average grade for each ore polygon. A random sampling of the area of the polygon blocks was conducted using a planimeter. While some minor variations in grades and tonnages were found, they were in the order of less than 5% both positive and negative. The writer therefore accepted the calculated tonnages and grades as accurate.

As is noted in the **Ore Reserve Section** of this Report, some additions were made to reflect (i) low grade in blocks which would have to be mined in the pit and (ii) waste in the old stopes.

All ore is massive sulphide and is assumed to weigh one ton per 8 cubic feet.

IV - 3.2 Ore Reserves

Open Pit - As noted previously, the most recent reserves were compiled by Norcomp in 1986. The writer reviewed the reserve ore blocks and conducted a random audit of the areas of the ore polygons and calculation of grades. This audit confirmed the accuracy of the calculation within small and acceptable deviations.

It was noted that some of the reserve blocks were beyond the apparent pit limits. Some blocks of lower grade material were not included in the calculated reserves but the writer felt that they should be included in order to "smooth" the pit outlines and as they would have to be mined in any event.

The old open stopes were replotted with some increase in area from those shown on the Norcomp plans. These stopes have been filled with waste in order to mine the pit. Grade of the fill material is not known but may contain some low values. The writer concluded that most of this material could be sorted out as waste in the mining schedule. An allowance was made for one third of this material to be included as dilution in the reserve calculations. In total, the open pitable ore reserves are calculated to be: (see Table 1).

870,000 tons @ 6.00% Zn; 0.760 opt Ag; 0.024 opt Au

=====

which includes 44,000 tons (5% dilution) from fill waste in old open stopes but is otherwise undiluted.

Due to the extent of drilling and previous mining on this deposit, the open pit reserves are considered to be proven.

Underground

In 1985, Noranda Exploration Company Limited, completed a report on the "Underground Ore Reserves on the Mines Gallen Property".

The Proven Ore (Main Zone) underground reserves are open pit reserves not recovered due to pit design. These reserves lie west of the pit and below the pit. The reserve estimate by Noranda, using pit ore polygons, were reviewed, checked and accepted by the writer.

The C and D Zones are separate Zones outside the pit. Underground reserves for the zones were re-calculated by the writer on vertical cross sections. The results are shown in Table 2 and detailed calculations are in Table 3.

For comparative purposes, the results of the writers calculations compared to Noranda estimates are:

		<u>% Zn</u>	<u>opt. Ag</u>	<u>opt. Au</u>
Noranda	237,439	6.78	0.87	0.024
Esson	247,783	6.69	0.81	0.037

Due to the substantial amount of closely spaced drilling of the deposit, both from surface and underground, the C and D Zone reserves are considered to be Probable.

In total, the underground ore reserves both Proven and Probable are:

395,000 T @ 7.12% Zn; 0.99 oz Ag/T; 0.035 oz Au/T
=====

Reserves, Total

Total reserves, in all categories, including both open pit and underground are therefore estimated to be:

1,265,000 tons at 6.35% Zn; 0.83 oz Ag/T; 0.027 oz Au/T
=====

Discussion

Final pit designs, when imposed upon these reserves, will determine the extractable totals but are expected to not deviate materially from those estimated herein. Pit design is in progress currently.

Waste to ore totals have been calculated by Norcomp at 0.91:1.0 (ore). Some of the reserves included in this report appear to be beyond the limits of the earlier open pit design. Should this prove to be the case, either the stripping would need to be increased or the reserves would have to be recovered, if possible, from underground.

The underground reserves have had dilution factors added as noted in Table 2 and should approximate mineable grades and tonnages.

WEST MACDONALD - TABLE 1

Open Pit Reserves, Proven

<u>Authority</u>	<u>Tons</u>	<u>Zn %</u>	<u>Grade Ag oz/T</u>	<u>Au oz/T</u>
Noranda -Confirmed by D.W. Esson	764,833	6.67	0.79	0.024
Low grade blocks in pit -by D.W. Esson	62,595	2.02	0.96	0.033
Waste in filled stopes (assumes 2/3 rejected in mining) -by D.W. Esson	44,000	0	0	0
	_____	_____	_____	_____
TOTAL (weighted)	871,428	6.00	0.76	0.024
say	<u>870,000</u>			

Note: Undiluted other than by 1/3 of waste in old stopes.

Table 3

Ore Reserve Calculations (8 cu.ft./T) Project; West MacDonald /UG; Date March 8, 1990

Section	Area ft. 2	Length Ft.	Tons	Average %Zn	T X G Grade, Weighted	
<u>C - Zone</u>						
6225 E	5880	37.5	27,562	7.37	203,132	
6200 E	--	--	--	--	--	No intersections
6175 E	10,340	50	64,625	6.29	406,491	
6150 E	--	--	--	--	--	Intersections on 6175
6125 E	11,418	37.5	53,522	7.07	412,119	
6100 E	2,162	25	6,756	5.80	39,185	
6075 E	1,778	25	<u>5,556</u>	7.04	<u>39,114</u>	
C Zone			<u>158,021</u>		<u>1,100,042</u>	
				Average Grade	<u>6.96% Zn</u>	

Table 3 con't

<u>D - Zone</u>	U = Upper L = Lower					
5825 E	1,680 U	25	5,250 U	7.74	40,635	
5850 E	640 U 1,380 L	25 25	2,000 U 4,312 L	7.06 7.99	14,120 34,453	
5875 E	555 U 2,570 L	37.5 37.5	2,602 U 12,049 L	8.36 7.55	21,753 90,970	
5900 E	--	--	--	--	--	No intersections
5925 E	3,512	37.5	16,465	7.81	128,592	
5950 E	2,415	25	7,547	10.83	81,734	
5975 E	1,810	25	5,656	8.21	46,436	
6000 E	500	25	<u>1,562</u> <u>57,443</u>		<u>12,543</u> <u>471,236</u>	
				Average Grade	8.20% Zn	
TOTAL UNDERGROUND			215,464		7.29% zN	

IV - 4 Exploration Potential

The West MacDonald property has been extensively explored by a number of companies over more than 50 years. Some earlier writers have concluded that little unexplored potential exists, at depths less than 1500 feet from surface.

It is probable that near surface massive sulphide deposits do not exist at depths above 500 ft., ie. the effective depth of surface geophysical survey techniques.

All the known sulphide bodies located to date on the property are at the breccia-granodiorite contact. All three deep (2000-3500 ft.) holes drilled by Noranda in 1976 failed to reach this contact, indicating a sharp change, if not reversal, in dip of this contact below 1000 ft. These holes did intersect a rhyolitic zone with low zinc values interpreted to be the "feeder pipe" to the massive sulphide deposits.

One possible way to reach this contact would be to attempt to re-enter the Noranda 1976 holes and deepen them. Since the altitude of the contact below 1000 ft. is unknown, the writer would prefer a series of vertical holes, three at minimum, to locate the contact in the 1200-1500 ft. range of depth. These holes should be spaced 500-600 ft. apart to allow effective down-hole EM surveys between holes.

IV - 5 Environmental Considerations

Of particular importance for the MacDonald mine, is the necessity to treat the acidic mine water. A water treatment plant built in the early 80's, is still operational with a capacity of 450 I.G.P.M.

Some 1.5 million tons of sulphide bearing waste rock has been stockpiled on surface, and although covered with clay this is still the major source of acid mine water production on the site. This waste rock will therefore be dumped back into the open pit at the end of operations and the pit allowed to flood. This will virtually curtail acid production by eliminating oxidization. (See surface plan in Volume II-Plans & Sections)

IV - 6 Mining

IV - 6.1 Open Pit

The open pit mining would follow the Noranda plan as it existed in 1985. This will entail the mining of the remaining 4 benches. Drilling will be 6.5 " diameter holes on a 16 ft. x 16 ft. pattern. This pattern, when optimized, could be increased and reduce the drilling and blasting costs. These tests will be done in the field.

Loading will be with a 988B loader and the haulage with 769C-35 ton capacity off highway trucks. Pit production is scheduled at 30,000 T.P.M. and with a stripping ratio of 0.91 to 1.0 will require removal of the same quantity of waste rock during the month.

IV - 6.2 U/G Access

Following the open pit mining, or near the completion, a ramp will be driven from near the pit bottom to access the underground reserves. The ramp decline will be 12 ft. x 16 ft. at a grade of -15%.

IV - 6.3 U/G Development

Development will include access drifts, ore drifts, slashing, and raising both on ore and waste. Since mining was done previously on four levels underground, use will be made of the existing openings to reduce and or facilitate development requirements. The amount of development is indicated in the schedule of operating costs.

IV - 6.4 Stopping

Stopping will be by the blasthole method utilising both large diameter 6.5" hole and smaller diameter 2.5" longholes. The mining method on a zone by zone basis is outlined below. Either up or down holes (2.5"dia.) will be utilised as necessary. The blasting will be in vertical slices, retreating towards the access. Mucking will be by 5 yard scooptram and haulage up the ramp with 30 ton low profile trucks. Drawpoints will be utilised where required, but otherwise, mucking will be in a retreat fashion negating the necessity for drawpoints. The ramp and access drift layout can be seen on plan in Volume II-Plans & Sections.

<u>ZONE</u>	<u>MINING METHOD</u>	<u>TONS/FT.</u>
West	Blasthole/Longhole	6 / 1.8
Central	Blasthole	6
"D" Zone	Blasthole	6
"C" Zone	Longhole	1.8

IV - 6.5 Production Rate

The underground production rate would be at 1,000 T.P.D. With blasthole stopping and mechanized mucking and haulage, the production rate should be readily attainable. Mine life for the underground reserves will be about 1.5 years. No backfill is envisaged for the underground mining.

IV - 6.6 Dilution

Care will be required in the blasting design and the loading and blasting practise in order to keep dilution to a minimum. Ground conditions in the massive sulphide should be fair.

IV - 6.7 Mine Services

The typical mine services required for an underground operation will be provided, including the following.

IV - 6.7.1 Ventilation & Heating

The mine ventilation and air heating will be the same as that for the Magusi property, which is detailed in Section III. The heading sizes, equipment selection, airway resistances and distances will be similar. The ventilation and heating capacities may be listed for reference as follows;

VENTILATION	-90,000 C.F.M. @ 8.0" S.P.
HEATING	- 7 M.B.T.U./HR. (Propane)

IV - 6.7.2 Power

The u/g power required will be taken u/g via the ventilation-escapeway raise to optimize cost and efficiency. The only power requirements u/g will be that for the pumps and the ventilation fans.

IV-6.7.3 Compressed Air

Compressed air for the I.T.H. drilling will be supplied from a compressor located on surface, capable of supplying 850 C.F.M. of air at 250-350 P.S.I.G. Compressed air for normal development or production, will be supplied by a compressor rated at 1500 C.F.M. at 110 P.S.I.G.

IV - 6.8 Mining Equipment

The mine equipment for both the open pit and the underground mining will be acquired through lease-purchase agreements over a two year period. A salvage value is also applied after the mine life as indicated in the summary of investment and operating costs.

The open pit mining equipment list is included in Appendix II and the underground mining equipment list can be found in Appendix I Section III.

Lease rates, based on equipment prices and quotations (see Section VII) were set at 5% of purchase price per month and written off over a period of 24 months. A salvage value of about 35% was applied based on the mine life and anticipated condition at the time of resale. The estimation of salvage value is indicated in Appendix I of Section III.

IV - 6.0 Metallurgy

The metallurgical aspects of this project are detailed in a companion Report by K.D. Hester, P. Eng.

As reported therein, recoveries for the West MacDonald ore are:

Zinc - Concentrate grade 53% Zn @ 88% recovery underground and 86% recovery open pit

Gold and Silver - 35% and 20% recovery in a low grade copper concentrate.

IV - 8 Plant

The complete surface plant is in place, and only the dry facilities would have to be added.

When the underground program is started, a compressor will be added to supply mine air for development purposes.

The water treatment plant is in good condition with no major repairs required. While the plant will be dismantled and probably transferred to other Deak projects in the area at the completion of the MacDonald, no salvage value has been included in the cost estimates.

The site arrangement can be seen in the surface plan included in Volume II-Plans & Sections.

IV - 9 Cost Estimates

IV - 9.1 Capital Costs

At the MacDonald mine, the only applicable capital cost would be that for equipment. In order to minimize the capital requirements, the equipment will be acquired through lease-purchase agreements.

Leasing costs for open pit equipment is estimated at \$143,500 per month and that for the underground equipment is estimated at \$125,000 per month.

For the first year, the equipment lease period will be for about 6 months based on the current schedule and this figure will be used for the initial capital requirement for equipment.

ie.) 6 months @ \$143,500 = \$861,000

The above costs are based on acquiring new equipment via the lease. The possibility of procuring good used equipment at better prices is possible and should be reviewed also.

IV - 9.2 Pre-Production Costs

The pre-production costs for the MacDonald mine are summarized below. The pit dewatering is estimated to take about 6 months and with 3 months of production during the first year.

<u>DESCRIPTION</u>	<u>COSTS</u>	
Engineering	50,000	
Dewater Pit	261,000	
Rehab. Pit	250,000	
Mob. for Mining	185,000	
Mining Ore	126,000	(40,000 Tons)
Mining Wst.	252,000	(80,000 Tons)
G.M.E.	418,000	
Plant	131,000	
Adminis.	<u>225,000</u>	
TOTAL =	\$1,898,000	

Two thirds of the ore and waste mining done in year one are taken as pre-production cost which will be required prior to normal production from the pit.

IV - 9.3 Operating Costs

The MacDonald mine operating cost estimates can be summarized as follows and are detailed in Appendices II and III.

<u>OPEN PIT MINING</u>	<u>DESCRIPTION</u>	<u>COST/TON</u>	
	Mining	\$ 5.98	4.74
	Milling	15.00	
	Gen.Mine Exp.	3.35	
	Plant	1.17	
	Admin.	2.87	
	Dewater & Rec.	4.51	
	Trucking	<u>4.50</u>	
	TOTAL	\$37.38	→
 <u>UNDERGROUND MINING</u>			
	Mining	\$12.79	
	Milling	15.00	
	Gen.Mine Exp.	8.08	
	Plant	\$ 2.88	
	Admin.	3.63	
	Dewater & Reh.	4.51	
	Trucking	<u>4.50</u>	
	TOTAL	\$51.39	

It should be noted that the mine equipment is left in as a capital cost as indicated in the cash flow and is not included in the operating costs.

Appendix I
MacDonald Property
Capital Cost Estimates

The only capital cost for MacDonald will be the mine equipment and this will be acquired through lease-purchase agreements. The calculated lease rate was based on the following:

Open Pit Equipment

<u>DESCRIPTION</u>	<u>NO. UNITS</u>	<u>COST/UNIT</u>	<u>TOTAL COST</u>
Drill I.T.H.	1	\$160,000	\$ 160,000
Comp. H.P.	1	130,000	130,000
Loader 988B	1	550,000	550,000
Trucks 35 T	4	400,000	1,600,000
Dozer D-8	1	275,000	275,000
Grader	1	100,000	100,000
Ser.Truck	1	25,000	25,000
Pick-Ups	2	15,000	<u>30,000</u>
TOTAL			\$2,870,000

Lease at 5% /mo. for 2 years=\$143,500/mo.

Salvage Value at 50% (Year 4) = \$1,435,000

Underground Equipment

The underground equipment is calculated at the same rate as that presented in Appendix I, Section III. The total lease cost for the underground equipment is \$125,000/mo.

Appendix II
Operating Costs
MACDONALD PROPERTY
OPERATING COST ESTIMATES

OPERATING COSTS-OPEN PIT

(880,000 Tons)

1.) MINING	COSTS	COST/TON
-Mine Ore 880,000 @ \$3.13	\$2,756,400	
-Mine Wst 800,800 @ \$3.13	2,506,504	
-General Mine Expense	2,945,200	
-Plant- Labour & Materials	1,025,400	
-Administration-Lab. & Mat'l.	2,537,800	
-Dewater & Rehab.	3,968,800	
TOTAL	\$15,728,104	\$17.87
 2.) MILLING		
-Deak Area Mill at V-Town		\$15.00
 3.) TRUCKING		
-Contract rate by T.N.O.		<u>\$ 4.50</u>
	TOTAL =	\$ 37.37

NOTE:

For detailed mining costs please refer to the Deak technical report where these costs were developed by the writer.

OPERATING COSTS-UNDERGROUND

(395,000 Tons)

1.) MINING	COSTS	COST/TON
-Ramp 1800 ft. @ \$311.58	\$561,000	
-Acc.Dr. 450 ft.@ \$250.53	113,000	
-Dr.Pts. 300 ft.@ \$250.53	75,000	
-Vent.Rse. 200ft.@ \$490.16	98,000	
-Ore Dr. 1325 ft.@ \$265.91	352,000	
-Slot Rse. 580 ft.@ \$165.52	96,000	
-Slashing 6000 T @ \$10.64	64,000	
-I.T.H.Dr.22825ft. @ \$4.73	108,000	
-I.T.H.BI.153403T @ \$1.30	199,000	
-I.T.H.Mu.153403T @ \$1.73	265,000	
-L.H. Dr. 118000ft.@ \$3.40	401,000	
-L.H.BI. 241496 T @ \$2.18	526,000	
-L.H.Mu. 241496 T @ \$1.73	418,000	
-Tram Wst. 44550 T @ \$4.04	180,000	
-Tram Ore 395000 T @ \$4.04	<u>1,596,000</u>	
TOTAL =	\$5,052,000	\$12.79
2.) DEWATER & RECLAIM.	1,781,450	\$4.51
3.) GENERAL MINE EXPENSE		
-Labour	1,537,800	
-Material	1,656,000	
TOTAL	\$3,193,800	\$ 8.08
4.) PLANT		
-Labour	259,200	
-Material	<u>878,400</u>	
TOTAL	\$1,137,600	\$ 2.88

5.) ADMINISTRATION		
-Labour	414,400	
-Material	<u>1,018,800</u>	
TOTAL	\$1,433,200	\$ 3.63
6.) MILLING		
-Deak mill in Virginiatown		\$15.00
7.) TRUCKING		
-Contract by T.N.O.		<u>\$ 4.50</u>
TOTAL		\$ 51.39

Appendix III

MacDonald Property

Schedule Of Operating Costs

SCHEDULE OF PLANT & ADMINISTRATIVE EXPENDITURES
(,000 \$)

DESCRIPTION OF WORK	UNITS OR AMOUNT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PLANT LABOUR COSTS		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-TRADESMAN 1	19.88	0	0	0	41	41	0	0	0	83
-TRADESMEN 2	21.20	0	0	0	44	44	0	0	0	88
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-EQUIP. OPERATOR	19.88	31	41	41	41	41	0	0	0	196
-LABOURER	17.23	27	36	36	36	36	0	0	0	170
PLANT MATERIAL COSTS		0	0	0	0	0	0	0	0	0
-HYDRO.POWER DIST.	0.05	77	103	103	378	378	0	0	0	1038
-COMPRESSORS	1000.00	0	0	0	12	12	0	0	0	24
-SHOP SUPPLIES	1500.00	9	18	18	18	18	0	0	0	81
-WATER, SEWAGE	500.00	5	6	6	6	6	0	0	0	29
-YARDS, ROADS	2000.00	18	24	24	24	24	0	0	0	114
-SECURITY	5000.00	0	60	60	60	60	0	0	0	240
-BLDG. MAINT., HEAT	1500.00	14	18	18	18	18	0	0	0	86
-		0	0	0	0	0	0	0	0	0
-SERV. VEHICLES	1200.00	7	14	14	14	14	0	0	0	65
-LOADER, TRUCK MTCE.	1500.00	9	18	18	18	18	0	0	0	81
-		0	0	0	0	0	0	0	0	0
PLANT COSTS-OPERATING		196	338	338	711	711	0	0	0	2294
ADMINISTRATIVE		0	0	0	0	0	0	0	0	0
-ADMIN. 1	14.58	23	30	30	30	30	0	0	0	144
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-MANAGEMENT	12000.00	108	144	144	144	144	0	0	0	684
-WAREHOUSE	19.88	0	0	0	41	41	0	0	0	83
-PURCHASING	21.20	0	0	0	44	44	0	0	0	88
-TELEPHONE, TELEX	2500.00	23	30	30	30	30	0	0	0	143
-TRAVEL, ACCOM.	1500.00	14	18	18	18	18	0	0	0	86
-INSURANCE	1500.00	14	18	18	18	18	0	0	0	86
-TRAINING, SAFETY	1500.00	9	18	18	18	18	0	0	0	81
-RECRUITMENT	1000.00	6	12	12	12	12	0	0	0	54
-OFFICE SUPP. LEASES	1500.00	9	18	18	18	18	0	0	0	81
-EMPLOYEE MED. SAFETY	1000.00	6	12	12	12	12	0	0	0	54
-ALLOCATED COSTS	0.00	0	0	0	0	0	0	0	0	0
-TAXES(MUN.)	1000.00	6	12	12	12	12	0	0	0	54
-ADMINISTRATION FEE	2.00	120	720	720	484	506	0	0	0	2550
TOTAL ADMINISTRATIVE COSTS		336	1,032	1,032	882	904	0	0	0	4186

SCHEDULE OF MINING WORK COSTS
(,000 \$)

DESCRIPTION OF WORK	RATE PER UNIT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
0		0	0	0	0	0	0	0	0	0
1.RAMP (12'x 16')	311.58	0	0	0	561	0	0	0	0	561
0		0	0	0	0	0	0	0	0	0
2.ACC. DR. (10'x13')	250.53	0	0	0	113	0	0	0	0	113
0		0	0	0	0	0	0	0	0	0
3.DR.PTS. (10'x 13')	250.53	0	0	0	75	0	0	0	0	75
0		0	0	0	0	0	0	0	0	0
4.VENT-ESC.RSE. (6'x 8')	490.16	0	0	0	98	0	0	0	0	98
0		0	0	0	0	0	0	0	0	0
5.	0.00	0	0	0	0	0	0	0	0	0
0		0	0	0	0	0	0	0	0	0
6.DR.DRIFTS (10'x 13')	265.91	0	0	0	352	0	0	0	0	352
0		0	0	0	0	0	0	0	0	0
7.SLOT RSE. (6'x 6')	165.62	0	0	0	96	0	0	0	0	96
0		0	0	0	0	0	0	0	0	0
8.SLASH ORE	10.64	0	0	0	64	0	0	0	0	64
0		0	0	0	0	0	0	0	0	0
9.I.T.H.DRILLING(6.5")	4.73	0	0	0	35	73	0	0	0	108
0		0	0	0	0	0	0	0	0	0
10.I.T.H. BLASTING	1.30	0	0	0	66	133	0	0	0	199
0		0	0	0	0	0	0	0	0	0
11.I.T.H. MUCKING	1.73	0	0	0	88	177	0	0	0	265
0		0	0	0	0	0	0	0	0	0
12.L.H.DRILLING (2.5")	3.40	0	0	0	149	252	0	0	0	401
0		0	0	0	0	0	0	0	0	0
13.L.H. BLASTING	2.18	0	0	0	198	328	0	0	0	526
0		0	0	0	0	0	0	0	0	0
14.L.H. MUCKING	1.73	0	0	0	157	261	0	0	0	418
0		0	0	0	0	0	0	0	0	0
15.TRAM WASTE	4.04	0	0	0	180	0	0	0	0	180
0		0	0	0	0	0	0	0	0	0
16.TRAM ORE	4.04	0	0	0	574	1,022	0	0	0	1596
0		0	0	0	0	0	0	0	0	0
PIT MINING		0	0	0	0	0	0	0	0	0
-ENGINEERING	50000.00	50	0	0	0	0	0	0	0	50
-DEWATER	390,000	390	390	390	390	195	0	0	0	1755
-RECLAMATION	500,000	0	0	0	1,000	2,000	1,000	0	0	4000
-REHAB. PIT	250,000	250	0	0	0	0	0	0	0	250
-MOB.PREP.	185,000	185	0	0	0	0	0	0	0	185
-MINE ORE	3.13	188	1,127	1,127	313	0	0	0	0	2754
-MINE WASTE	3.13	376	1,025	1,025	80	0	0	0	0	2507
TOTAL MINING COSTS		1,438	2,542	2,542	4,590	4,441	1,000	0	0	16554

SCHEDULE OF SUPERVISION AND LABOUR OVERHEADS

DESCRIPTION OF WORK		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
-MINE ENGINEER	HOURS	1560	2080	2080	2080	2080				9880
-PROJECT ENGINEER	HOURS									0
-MINE GEOLOGIST	HOURS	1040	2080	2080	2080	2080				9360
-ASSIST. GEOLOGIST	HOURS	520	2080	2080	2080	2080				8840
-TECHNICIAN 1	HOURS	1040	2080	2080	2080	2080				9360
-TECHNICIAN 2	HOURS	1040	2080	2080	2080	2080				9360
-TECHNICIAN 3	HOURS	520	2080	2080	2080	2080				8840
-TECHNICIAN 4	HOURS									0
-MINE SHIFTBOSS	HOURS	1560	4160	4160	4160	4160				18200
-MINE TRAINER	HOURS				1040	2080				3120
-MECHANIC	HOURS	4680	8320	8320	8320	8320				37960
-ELECTRICIAN	HOURS	1560	4160	4160	4160	4160				18200
-OTHER TRADES	HOURS	4680	6240	6240	6240	6240				29640
-MINER 1	HOURS	1560	2080	2080	2080	2080				9880
-MINER 2	HOURS	1560	2080	2080	2080	2080				9880
										0
										0
										0
										0
										0
MONTHLY MATERIAL COSTS										0
-GEO.&ENG. SUPPLIES	MONTHS	6	12	12	12	12				54
-MINE RES.&TRAIN.	MONTHS	3	12	12	12	12				51
-MISC. PIT	MONTHS	9	12	12	12	0				45
-MINE DRY	MONTHS	9	12	12	12	12				57
-MINE DEWATERING	MONTHS	9	12	12	12	12				57
-VENTILATION	MONTHS				12	12				24
-SIGNALS, TELEPHONE	MONTHS				12	12				24
-	MONTHS				12	12				24
-MINERS LAMPS	MONTHS				12	12				24
-SMALL TOOLS	MONTHS	9	12	12	12	12				57
-LEVEL MTCE.	MONTHS				12	12				24
-BULKHEADS, CONST.	MONTHS				12	12				24
-	MONTHS				12	12				24
-MINE AIR HEATING	MONTHS				12	12				24
-DEF. D.D.	MONTHS				12	12				24
-PIPE LINES	MONTHS				12	12				24
-WASTE DISPOSAL	MONTHS	9	12	12	12	12				57
-ORE HANDLING	MONTHS	9	12	12	12	12				57
-GROUTING	MONTHS				12	12				24
-UG.SHOP SUPPLIES	MONTHS				12	12				24
-OTHER	MONTHS	9			12	12				33
-CONSULTANTS	MONTHS	9	12	12	12	12				57

SCHEDULE OF SUPERVISION AND LABOUR EXPENDITURES
(,000 \$)

DESCRIPTION OF WORK	COST PER HOUR	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
-MINE ENGINEER	29.74	46	62	62	62	62	0	0	0	294
-PROJECT ENGINEER	24.97	0	0	0	0	0	0	0	0	0
-MINE GEOLOGIST	28.55	30	59	59	59	59	0	0	0	267
-ASSIST. GEOLOGIST	24.97	13	52	52	52	52	0	0	0	221
-TECHNICIAN 1	15.90	17	33	33	33	33	0	0	0	149
-TECHNICIAN 2	17.23	18	36	36	36	36	0	0	0	161
-TECHNICIAN 3	19.88	10	41	41	41	41	0	0	0	176
-TECHNICIAN 4	24.97	0	0	0	0	0	0	0	0	0
-MINE SHIFTBOSS	27.36	43	114	114	114	114	0	0	0	498
-MINE TRAINER	27.36	0	0	0	28	57	0	0	0	85
-MECHANIC	22.53	105	187	187	187	187	0	0	0	855
-ELECTRICIAN	23.77	37	99	99	99	99	0	0	0	433
-OTHER TRADES	22.53	105	141	141	141	141	0	0	0	668
-MINER 1	21.20	33	44	44	44	44	0	0	0	209
-MINER 2	22.53	35	47	47	47	47	0	0	0	223
0	26.16	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0
MONTHLY MATERIAL COSTS		0	0	0	0	0	0	0	0	0
-GEO.&ENG. SUPPLIES	1,200	7	14	14	14	14	0	0	0	65
-MINE RES.&TRAIN.	1,000	3	12	12	12	12	0	0	0	51
-MISC. PIT	7,000	63	84	84	84	0	0	0	0	315
-MINE DRY	500	5	6	6	6	6	0	0	0	29
-MINE DEWATERING	500	5	6	6	6	6	0	0	0	29
-VENTILATION	1,000	0	0	0	12	12	0	0	0	24
-SIGNALS, TELEPHONE	300	0	0	0	4	4	0	0	0	7
-	0	0	0	0	0	0	0	0	0	0
-MINERS LAMPS	500	0	0	0	6	6	0	0	0	12
-SMALL TOOLS	1,000	9	12	12	12	12	0	0	0	57
-LEVEL MTCE.	1,500	0	0	0	18	18	0	0	0	36
-BULKHEADS, CONST.	1,000	0	0	0	12	12	0	0	0	24
-	0	0	0	0	0	0	0	0	0	0
-MINE AIR HEATING	11,000	0	0	0	132	132	0	0	0	264
-DEF. D.D.	5,000	0	0	0	60	60	0	0	0	120
-PIPE LINES	500	0	0	0	6	6	0	0	0	12
-WASTE DISPOSAL	1,500	14	18	18	18	18	0	0	0	86
-ORE HANDLING	500	5	6	6	6	6	0	0	0	29
-GROUTING	2,500	0	0	0	30	30	0	0	0	60
-UG.SHOP SUPPLIES	1,000	0	0	0	12	12	0	0	0	24
-OTHER	1,500	14	0	0	18	18	0	0	0	50
-CONSULTANTS	1,000	9	12	12	12	12	0	0	0	57
TOTAL COSTS		624	1,085	1,085	1,423	1,368	0	0	0	5587

V ISO MAGUSI PROPERTY

V - 1 Claims and Ownership

The Magusi development property is comprised of 47 claims and one Mining Lease (ML 651) in Hebecourt and Montbray Townships, Quebec. Under an agreement with Noranda Exploration Company, Deak is committed to place Mining Lease 651 into production at its own cost with Noranda retaining a 25% net profit interest. The area of M.L. 651 is 622.32 acres

The adjoining 47 claims are covered, along with other properties in the area, by a Joint Venture Agreement for exploration with Noranda as operator. Deak has provided the first \$2 million for exploration of these properties with further expenditures shared 50/50, subject to dilution of a non-participating partner.

V - 2 Property Geology and History

V - 2.1 Geology

The property is underlain by pillowed mafic volcanics, tuffs and rhyolites intruded by large masses of diorite. Generally speaking, the footwall of the deposit is comprised of the mafic volcanics while the hangingwall is the felsic volcanics intruded by chlorite and quartz feldspar porphyry. These units strike east-west and dip south at about 50°.

The Magusi massive sulphide body is complex, with a strike length of some 1700 ft. and extends at least 1300 ft. down dip. This lens is hosted by a sequence of highly schistose, carbonated volcanics interpreted by some to be a shear zone concordant with the host volcanic units. Most authors believe the Magusi deposit to be the distal phase of the same exhalite sequence that produced the Hebecourt deposit some 4000 ft. to the east.

The main sulphide lens has a maximum width of 115 ft. at the west end, tapering to less than 10 ft. to the east. Jarvi (1976) identified four zones of mineralization being:

The zinc zone at the west end of the massive sulphides has a strike length of 300 ft., a maximum width of 90 ft. tapering at depth and pinching out at about 600 ft. below surface. This zone contains all the ore reserves of this Report.

The footwall mixed zone occurs at the east end of the zinc zone with copper-zinc mineralization tapering off at both upper and lower contacts of the massive sulphides. This zone is not ore-grade under current economic conditions.

The footwall copper zone is confined to the footwall of the massive sulphides east of the mixed zone, with values in copper only. This zone also is not ore at current prices.

The hangingwall copper zone occurs at depth of 500 to 850 ft. below surface where the massive sulphide zone appears to split into two zones with copper mineralization in the upper band. This zone commences about where the footwall zone dies out. This zone also does not make ore-grade.

V - 2.2 History

Apart from some regional exploration for gold in the 1930's and 40's, the first base metal exploration is believed to have been an airborne electromagnetic survey by Inco in the 1960's. Mining Corporation drilled one hole in 1962 apparently as a follow-up to this survey. This hole was collared in the footwall and drilled down dip, missing the massive sulphides by some 20 ft.

No further work was reported in the area until 1972 when an aerial survey was released by the Government of Quebec. The resulting anomaly was staked immediately and subsequently optioned to predecessor companies of Teck Corp. These companies drilled-off the massive sulphide deposit. In 1974 the property was purchased by Noranda Mines.

Despite numerous internal studies by Noranda of the economics of placing the deposit into production, it has not been exploited to date.

V - 3 Ore Reserves

In March of 1989 the writer calculated an ore reserve for the Magusi deposit based on a concept of mining the deposit by open pit with a limited production from underground. Subsequent testing of the overburden revealed that the clays and silts were unstable, which would cause excessive stripping. Accordingly, this report deals with underground extraction only.

V - 3.1 Methodology

Drill logs, cross sections and plans were available from previous operators. The writer used cross sections at a scale of 1 in. = 50 ft. on sections plotted at 100 ft. intervals to identify ore-grade sections. Average grades were re-checked and re-calculated from drill logs.

1. Drill section lines are spaced at 100 ft. intervals on strike, thus each ore-grade section has a horizontal influence of 100 ft. i.e. 50 ft. each way on strike.
2. On section, the ore intercepts are spaced from 80 ft. to 160 ft., averaging about 100 ft. The area of influence of each intercept was taken half way to the next intercept, both up and down dip. Where no continuity of mineralization was evident, the area of influence was taken to be the lesser of 50 ft. or half way to the next intercept.
3. Dilution was calculated at 15% for the probable reserves at a calculated average grade of 0.37% Cu, 1.00 o.p.t. Ag and 0.01 o.p.t. Au. Possible reserves were not diluted.
4. The bulk of the reserves based on sections 100 ft. apart on strike are considered to be in the drill indicated probable category. Additional fill in drilling on sections 50 ft. apart is required to refine the ore outlines.
5. Tonnage factor, based on previous specific gravity investigations, was 7.5 cu. ft. per ton.

Total calculated diluted probable ore reserves as detailed on Magusi Table 1 herein are:

1,170,470 tons @ 0.28% Cu; 6.71% Zn; 0.90 o.p.t. Ag and 0.065 o.p.t. Au.

Possible reserves are:

186,933 tons @ 0.44% Cu; 4.30% Zn; 0.077 o.p.t. Ag. and 0.022 o.p.t. Au.

14-Mar-90

Magusi - Table 1

Tonnage Factor = 7.50

Section	Block No.	Vertical True Width	Horizontal	Cu	Zn	Ag	Au	Volume	Tons	
9400 E	1	45	25	100	0.37	7.44	1.22	0.068	112,500	15,000
	2	50	30	100	0.37	7.44	1.22	0.068	150,000	20,000
	3	45	15	100	0.45	8.98	1.05	0.072	67,500	9,000
					0.39	7.76	1.19	0.069	330,000 ✓	44,000 ✓
9500 E	1	100	95	100	0.15	6.06	0.41	0.051	950,000	126,667
	2	45	90	100	0.15	6.06	0.41	0.051	405,000	54,000
	3	45	90	100	0.50	8.53	1.47	0.060	405,000	54,000
	4	35	80	100	0.50	8.53	1.47	0.060	280,000	37,333
	5	35	65	100	0.18	9.62	1.07	0.063	227,500	30,333
	6	135	50	100	0.18	9.62	1.07	0.063	675,000	90,000
	7	135	28	100	0.13	7.48	1.80	0.141	378,000	50,400
	8	60	10	100	0.13	7.48	1.80	0.141	60,000	8,000
				0.23	7.69	0.98	0.068	3,380,500	450,733 ✓	
9600 E	1A	40	55	100	0.28	7.35	0.87	0.054	220,000	29,333
	1	45	65	100	0.28	7.35	0.87	0.054	292,500	39,000
	2	45	70	100	0.42	5.56	0.52	0.030	315,000	42,000
	3	80	80	100	0.42	5.56	0.52	0.030	640,000	85,333
	4	80	85	100	0.29	8.61	0.87	0.069	680,000	90,667
	5	120	80	100	0.29	8.61	0.87	0.069	960,000	128,000
	6	120	45	100	0.09	8.19	0.85	0.170	540,000	72,000
	7	55	25	100	0.09	8.19	0.85	0.170	137,500	18,333
	8	55	16	100	0.09	8.19	0.85	0.170	88,000	11,733
	9	50	10	100	0.19	6.53	0.70	0.110	50,000	6,667
				0.28	7.59	0.78	0.078	3,923,000	523,067 ✓	
	Drill Indicated (Probable)			0.26	7.65	0.89	0.073	7,633,500	1,017,800	
	Dilution			0.37	0.45	1.00	0.010		152,670	
	Total Probable Diluted			0.28	6.71	0.90	0.065		1,170,470	
9700 E	1	50	20	100	0.66	5.75	1.41	0.038	100,000	13,333
	2	135	18	100	0.66	5.75	1.41	0.038	243,000	32,400
	3	135	14	100	0.38	2.91	0.45	0.017	189,000	25,200
	4	100	13	100	0.38	2.91	0.45	0.017	130,000	17,333
	5	100	15	100	0.43	4.83	0.70	0.013	150,000	20,000
	6	50	10	100	0.44	4.27	0.58	0.018	50,000	6,667
				0.50	4.45	0.88	0.025	862,000	114,933	
9800 E	1	100	11	100	0.35	4.57	0.67	0.017	110,000	14,667
	2	80	18	100	0.35	4.57	0.67	0.017	144,000	19,200
	3	80	22	100	0.34	3.60	0.54	0.019	176,000	23,467
	4	50	22	100	0.34	3.60	0.54	0.019	110,000	14,667
				0.345	4.056	0.601	0.018	540,000	72,000	
	Possible Reserves			0.442	4.300	0.774	0.022	1,402,000	186,933	

V - 3.2 Ore Reserves - Mining

The geological reserve blocks were reviewed by N. Lecuyer and applicable recovery and dilution estimates were done for each block. Factors including location (type of ground), dip of the hanging and/or footwall and selected mining method were considered when estimating the above. Reference should also be made to section V - 6.5 of this report, dealing with dilution. The mining reserves are listed in Table M-3.

TABLE M-3

MAGUI MINING RESERVES

SECTION	BLOCK	TONS	%REC.	TONS.REC.	%DIL.	TONS.DIL.	TOTAL TONS
9400E	1	15000	90	13500	15	2025	15525
	2	20000	100	20000	20	4000	24000
	3	9000	90	8100	25	2025	10125
SUB-TOTAL		44000		41600		8050	49650
9500E	1	126667	90	114000	25	28500	142500
	2	54000	90	48600	25	12150	60750
	3	54000	90	48600	15	7290	55890
	4	37333	90	33600	15	5040	38640
	5	30333	90	27300	15	4095	31395
	5 W	4000	-	4000	-	-	4000
	6	90000	90	81000	20	16200	97200
	7	50400	90	45360	20	9072	54432
	8	8000	90	7200	20	1440	8640
8 W	5600	-	5600	-	-	5600	
SUB-TOTAL		460333		414660		83787	498447
9600E	1A	29333	90	26400	25	6600	33000
	1	39000	90	35100	25	8775	43875
	2	42000	90	37800	25	9450	47250
	3	85333	90	76800	15	11520	88320
	4	90667	90	81600	20	16320	97920
	5	128000	90	115200	20	23040	138240
	6	72000	90	64800	20	12960	77760
	7	18333	90	16500	20	3300	19800
	8	11733	90	10560	20	2112	12672
9	6667	0	-	0	-	-	
SUB-TOTAL		523066		464760		94077	558837

SUMMARY

SECTION	TONS.REC.	%Cu	%Zn	Oz. Ag.	Oz. Au.	
9400E	41600	0.39	7.76	1.19	0.069	
9500E	414660	0.23	7.69	0.98	0.068	
9600E	464760	0.28	7.61	0.78	0.078	
SUB-TOTAL		921020	0.26	7.65	0.89	0.073
DILUTION		185914	0.35	0.43	0.95	0.010
TOTAL		1106934	0.28	6.44	0.90	0.062

V - 4 Exploration Potential

The Magusi mining lease has been extensively tested both along strike and down dip of the massive sulphide deposit. There would appear to be limited potential for locating additional reserves other than at vertical depths exceeding 1500 ft.

The host schist unit does extend east of the massive sulphide zone and some deep EM surveys would be warranted in that direction.

Possibly, the most likely addition to the reserves would from a copper price sufficiently high to place the copper-rich zones in the ore category. The two copper zones have a total tonnage estimated to be:

1,432,000 tons averaging approximately 2% Cu; 0.6% Zn; 1 o.p.t. Ag. and 0.01 Au. after 15% dilution.

IV - 5 Environmental

There are essentially two major environmental considerations to be addressed at the Magusi property, which include, the overburden storage location to be used and the mine water treatment facilities that will be required.

IV - 5.1 Overburden Storage Area

The overburden removal to expose the orebody at surface will entail excavation of approx. 1 million cubic yards of overburden. It is proposed that this clay overburden be placed in a depression area to the west of the site which presently is flooded area during the spring. The overburden excavation limits are shown on plan MG-1, Volume II. This proposal would necessitate prior approval of the Ministry of the Environment (MENVIQ). If accepted, the site offers the advantage of proximity thereby minimizing haulage costs. The proposed storage area is shown on Fig-M-2 that follows.

IV - 5.2 Mine Water Treatment

The second environmental consideration for Magusi will be treatment of acidic mine water. Both the Magusi and Hebecourt properties consist of massive sulphides and subsequent oxidation following exposure will result in acid mine water.

A water treatment plant (W.T.P.) will be installed to service both the properties. The Hebecourt property will produce a more acidic mine water due to its high pyrrhotite content(65%). The Magusi orebody does not contain any pyrrhotite according to reports.

In addressing the water treatment, the plant capacity was established by first determining the drainage basin area of each of the properties from topographic plans. These basin sizes were estimated as follows;

Magusi	40 Acres	Hebecourt	84.5 Acres
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Following the basin size estimation, the volumes of water inflow were calculated, using the *following* relationship *Ship*.

$$\text{FLOW} = \text{BASIN AREA} \times \text{SQ.FT./AC.} \times \text{RUNOFF RATE(in.)}/12$$

Flow = in cubic feet M = Million

Basin Area = acres

Runoff Rate = inches R Factor 7.48 U.S.G./CU.FT.

Therefore for Magusi;

$$\text{FLOW} = 40 \times 43560 \times R/12 \times 7.48 = 1.09M \text{ R U.S.GAL.}$$

and for Hebecourt;

$$\text{FLOW} = 84.5 \times 43560 \times R/12 \times 7.48 = 2.3M \text{ R U.S.GAL.}$$

From the annual runoff records for the Kinojevis River Watershed (Table M-1) the 12 year average was taken to estimate the monthly volumes for each site as listed below:

<u>MONTH</u>	<u>INFLOW (IN)</u>	<u>U.S.GAL/MO.(MILLION)</u>	
		<u>MAGUSI</u>	<u>HEBECOURT</u>
JAN.	0.52	0.57	1.20
FEB.	0.44	0.48	1.00
MAR.	0.65	0.71	1.50
APR.	3.98	4.34	9.15
MAY	4.24	4.61	9.75
JUN.	2.00	2.18	4.60
JUL.	1.10	1.20	2.50
AUG.	0.91	0.99	2.10
SEP.	1.15	1.25	2.53
OCT.	1.63	1.78	3.75
NOV.	1.33	1.45	3.06
DEC.	0.75	<u>0.82</u>	<u>1.73</u>
TOTAL/ YEAR.		20.39	42.87

TABLE M-1

MONTHLY AND ANNUAL RUNOFFS IN INCHES FROM THE RIVIERE KINOJEVIS WATERSHED
AT STATION NO. 043012 (WATERSHED AREA = 2590 SQ KM)

YEAR	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	12 yr Avg
MONTH													
JAN	0.37	0.54	0.55	0.47	0.61	0.44	0.51	0.52	0.46	0.81	0.51	0.50	0.52
FEB	0.33	0.44	0.40	0.42	0.44	0.35	0.40	0.35	0.39	0.53	0.84	0.38	0.44
MAR	0.38	0.42	1.32	0.41	0.37	0.97	0.94	0.33	0.50	0.66	1.15	0.38	0.65
APR	3.11	1.70	3.71	4.37	2.48	6.14	6.42	1.38	4.85	5.47	5.48	2.61	3.98
MAY	3.86	4.39	3.49	5.92	4.07	4.14	3.11	5.07	6.25	3.11	2.97	4.44	4.24
JUNE	1.67	1.81	1.32	3.16	2.66	1.42	1.47	2.89	3.71	1.05	1.48	1.39	2.05
JULY	1.02	0.84	0.88	1.02	0.94	1.36	1.13	1.57	1.63	1.00	0.85	1.01	1.10
AUG	0.66	0.75	0.73	1.04	0.79	1.41	0.58	0.69	2.16	1.14	0.49	0.53	0.91
SEPT	0.97	0.74	1.42	1.59	0.75	1.95	0.55	0.55	1.42	1.75	0.99	1.17	1.15
OCT	0.86	1.74	1.53	2.98	0.70	1.22	0.65	1.54	2.76	2.01	1.99	-----	1.63
NOV	1.55	0.72	1.04	2.03	1.09	1.03	1.34	0.73	2.76	1.33	1.00	-----	1.33
DEC	0.81	0.51	0.61	0.84	0.68	0.66	0.70	0.49	1.60	0.73	0.63	-----	0.75
TOTAL	15.60	14.61	16.98	24.23	15.58	21.09	17.79	16.11	28.47	19.57	18.38	-----	18.70
April + May	6.97	6.09	7.20	10.29	6.55	10.28	9.53	6.45	11.10	8.58	8.45	6.05	

* Data for these months are not available at this time.

Stream gauging station is located 8 km, north-east of the city of Rouyn-Noranda.

48° 21' 5" Lat.

78° 51' 29" Long.

	MAGUSI	HEBECOURT
AVG./MO.	1.70M	3.57M
AVG.FLOW U.S.G.P.M.	39	83
HIGHEST FLOW U.S.G.P.M.	107	226
HIGHEST FLOW I.G.P.M.	89	200

*mining expansion
exp. details
exp. capacity*

Although this considers only the runoff water volumes and groundwater flow will also exist, its influence is more difficult to ascertain until actually underground. Therefore an initial plant design of 200 I.G.P.M. would be recommended with the possibility to expand at a later date should the need arise.

With the mining schedule, Magusi and Hebecourt would run simultaneously during half of year 5 and half of year 6. This is the only time were both volumes would have to be treated and a temporary capacity increase would be necessary.

Storage of the sludge produced from the treatment would be in a sedimentation basin. The basin size was determined initially by the total volume to be treated and based on obtaining a 15% sludge density.

	<u>VOLUME TREATED</u> M.GAL.	<u>SLUDGE</u> (CU.FT)
MAGUSI	68	727,000
HEBECOURT	<u>107</u>	<u>1,143,000</u>
TOTAL	175	1,870,000

To size the sedimentation basin, a volume of 1 million CU.FT. was utilised, assuming storage of the Magusi sludge plus the initial sludge from Hebecourt.

Once the Magusi is completed, the sludge from the Hebecourt treatment which is a stable sludge of metal hydroxides and sulphates can be pumped into the Magusi mine for disposal. Hence the sedimentation basin size would be as follows;

VOLUME = 1,000,000 CU.FT.

BASIN DEPTH = 10 FT. (Plus 3 FT. Freeboard)

EQUIV. AREA = 1,000,000 / 10 = 316 SQ.FT.

BASIN SIZE = 250 FT. x 400 FT.

To provide some added retention and polishing time use a polishing pond at 20% of the size of the sedimentation basin.

BASIN SIZE = 140 FT. x 140 FT.

The sedimentation basin, would be excavated in year 2 because underground development will be in waste only during the first year.

The time requirement for construction of the W.T.P. is difficult to establish since contaminated water during the first years at Magusi will be more dilute, becoming more acidic during later years as more rock surface is exposed underground. During the second year, the water could be pumped to the sedimentation basin and lime could be added manually to raise pH and promote settling of suspended solids. This process would be dependant on the degree of acidity of the water. For this study, the W.T.P. is scheduled for year 3 and may have to be moved either up or back depending on actual conditions.

In order to minimize acid mine water production, there are several points to consider as a result of the experience that has been gained over the last 10 years at the West MacDonald.

These points include the following;

- 1.) Conduct any fresh water away if possible ie. via drainage ditches.
- 2.) Minimize sulphide waste/ore that is exposed to the air and rain.
- 3.) Keep any surface stockpile area to a strict minimum. ie. reduced surface area.
- 4.) Temporarily cover up any ore stockpile that can be covered.

The underground approach to mining Magusi will certainly aid in limiting the amount of waste that has to be mined and removed for stockpiling on surface as compared to open pit mining which would have called for excavation and storage area for some 2 million tons of sulphide waste.

V-5.3 Water Treatment Costs

The operating cost's for the water treatment can be estimated from the MacDonald (Gallen) mine which has operated their plant since the early 1980's. The latest cost figures indicate a cost of \$4.60/1,000 imperial gallons.

Therefore assuming that all the water is treated, the annual costs for water treatment for the properties would be as follows:

MAGUSI

$$\text{COST/YR.} = 20.39\text{M GAL.} \times 0.83 \times \$0.0046 = \$77849$$

$$\text{COST/MO.} = \$6487 \text{ SAY } \$6500/\text{MO.}$$

HEBECOURT

$$\text{COST/YR.} = 42.87\text{M GAL.} \times 0.83 \times \$0.0046 = \$163,678$$

$$\text{COST/MO.} = \$13640$$

The largest portion of the operating cost's is undoubtedly the cost for lime which will be proportional to the degree of acidity of the mine water.

The W.T.P. will be operated on a periodic basis since volume during the winter months will be low. The estimated time of required treatment and costs for the Magusi and Hebecourt properties are outlined below. These figures are approximates and could vary considerably depending on acidity levels and the volume variance in an extremely dry or wet season.

YEAR	MAGUSI PROP.		HEBECOURT PROP.	
	NO.MO.	COSTS	NO.MO.	COSTS
1	-	-	-	-
2	4	26	-	-
3	8	52	-	-
4	8	52	-	-
5	6	39	4	55
6	2	13	6	82
7	-	-	8	109
8	-	-	8	109
	TOTAL	182		355

** would the mine not flood up to the lake level then ± acidity*

The capital cost for the W.T.P. has been estimated at \$624,000 and that for the basins at \$100,000. The estimates can only be considered "order of magnitude" at this time. When the environmental permitting study is carried out, acid generation tests will be completed, providing a more precise value of the metal loadings and anticipated pH levels.

The geotechnical study will be completed for optimum basin location and alternatives to possibly reduce treatment volumes or alternate solutions for treatment may be examined.

7. Is this a walk-away situation after mining is completed?

V - 5.4 Infrastructure

The infrastructure requirements were assessed with the intent of servicing both the Magusi and Hebecourt properties. The site surface plan M-3, Vol. II, indicates the location of the infrastructure in relation to each property. The travel distance to each mine portal of about 4500 feet, was considered advantageous as compared to making a site installation for Magusi and later moving the site installation to Hebecourt. Also slashing at the selected mine site area was already done during the 70's and as a result slashing will be limited to small growth.

V - 5.5 Potable And Process Water

Both the potable and process water for underground drilling or the surface plant, can be sourced from either Lac Duparquet or the Magusi river as apparent from Fig. M-2.

V - 5.6 Power

The hydro power is not on site and would have to be brought in from approximately 20 km. distance. The costs for the installation was provided by Hydro Quebec and is included in the Section VII.

Since the quoted delay time for installation of the line was 6-12 months, the first 6 months of operation were costed using diesel generated power.

The power requirements for the Magusi property were estimated as follows:

ITEM	HORSE POWER	KILOWATTS
Compressors L.P. (2)	500	375
Compressor H.P. (1)	300	225
Pumps M.&P. (2 @ 125)	250	187.5
Water Treatment Plant	150	112.5
Garage & Service Bldg.	100	75
Dry	50	37.5
Office	30	22.5
Vent. & Heating	250	187.5
Misc.(10%)	<u>163</u>	<u>122</u>
TOTAL	1793	1345

Therefore install 1500 KW transformer.

In discussions with Hydro Quebec it was concluded that this particular mine operating with the connected load would have a utilisation factor of approximately 65 %. The expected monthly consumption would then be as follows;

$$\text{KWHR./MO/} = 1500 \times .65 \times 24 \times 30 = 702,000$$

At this power rating, the properties are in the medium power category (100-5000 KW.) as concerns the billing rates. The following Tarif M, would be applicable to the properties.

TARIF CLASS-M

- 1.) \$4.47/KW. of subscribed power
- 2.) \$0.0583/KWHR. for the first 120 hours.
- 3.) \$0.0365/KWHR. for the next 78,000 KWHR.
- 4.) \$0.0252/KWHR. for the balance of consumption.

The expected monthly billing can be estimated then as;

- 1.) $\$4.47 \times 1500 \times .65 = \$ 4358$
 - 2.) $\$0.0583 \times 120 \times 1500 \times .65 = \$ 6821$
(117,000)
 - 3.) $\$0.0365 \times 78,000 = \$ 2847$
 - 4.) $\$0.0252 \times (702000-195000) = \12776
- TOTAL $= \$26802 = .038 \text{ SAY} = \$0.04/\text{KWHR. AVG.}$

The capital cost of this power line based on 20 km. of 25 KV. line would be \$600,000.00 , which is payable to Hydro Quebec on signing of the agreement. Part of this capital is recoverable in accordance with Hydro Quebec's regulation 411. The applicable amount in this case would be calculated as follows;

$$1500 \text{ KW.} \times .65 \times \$325/\text{KW.} = \$316,875.00$$

This amount, can be recovered over a maximum period of 10 years. A refund is calculated each year on the anniversary day limited to a maximum of 25% of the billings over the past 12 months. The annual refund possible in this case would be;

$$\$26800/\text{MO.} \times 12 \times 0.25 = \$80,400$$

The above mentioned refund could be increased, if the subscribed power is increased. The subscribed power in this case is 65% of 1500 KW. or 975KW. and this is therefore the minimum billing amount. It is important not to start with a higher subscribed power, because although a client may increase the subscribed at any time and recuperate any penalties for 3 months prior this new subscribed power may not be reduced for a period of one year once increased.

From the hydro quote, this line could take from 6-12 months to install. Therefore the power requirements for the first 6 months have been estimated as diesel generated power as indicated below.

<u>UNDERGROUND</u>	<u>HORSEPOWER</u>
Compressor (1)	350
Fan (1)	75
Pumps	<u>25</u>
SUB-TOTAL	450
<u>SURFACE</u>	<u>HORSEPOWER</u>
Dry & Office	30
Construction	<u>50</u>
SUB-TOTAL	80
TOTAL	530 H.P. ^{OR} OF 397.5 KW.

DIESEL GENERATOR- 400 KW. CAPACITY D379 V8

- Supplier Hewitt Mtl.

1.) Rental- for minimum 6 months	= \$ 6,668/MO.
2.) Fuel- 14 30 G.P.H.x24x30x\$2.25/GAL.	25,200 = \$48,000/MO.
3.) Mtce.-\$5/Hr. x 24 x 30	= \$ 3,600/MO.
TOTAL	= \$58,868/MO. <i>\$35,468</i>

Thus these costs will apply for the first 6 months and then the hydro costs of \$27,000/ month are used.

V - 5.7 Buildings

The main buildings on site include the following;

- 1.) Office and Dry Complex 50' x 100' ✓
- 2.) Garage and Service Bldg. 40' x 100' ✓
- 3.) Water Treatment Plant 50' x 60' ✓

The floor plan drawings for each of these buildings follow, showing the access doors and the interior arrangement for the different departments. The building arrangements can be seen on the site surface plan M-3, Vol. II. These are standard light steel structures but have been designed to incorporate the indicated overhead crane beams. Estimates are based on quoted prices from a local supplier and details are included in Section VII.

V - 5.8 Communications

During the early stages of the development, a mobile phone will be used and consequently a permanent line will be installed using the existing power line poles.

V - 5.9 Accommodations & Travel

While only some 25 miles from Rouyn-Noranda, personnel will travel this on a daily basis. A travelling allowance on an hourly basis has been incorporated in the costs. Since the mine portals are about 4500 feet from the dry, a service van has also been included in the costs.

V - 5.10 Safety

Safety as always, will be of prime importance. Because of the location, an ambulance has been included in the capital cost's. The office area will include a first aid room which shall be properly equipped.

Personnel will be trained to assure that first aid service is available on every shift.

Both the underground compressed air and main ventilation system will have stench gas warning apparatus installed in case of an underground fire.

V - 6 Mining

V - 6.1 Underground Access

Initially, part of the Magusi orebody was assessed for mining by open pit. Results of the geotechnical program indicated an initial slope of 7.5:1 which was later revised to 10:1. With these low angle slopes, it was decided to strip only the overburden required to expose the crown pillar for eventual recovery.

The various contours and stripping quantities examined are included on plan MG-1, Vol.II.

Since the zone of interest was within 600 feet of surface, a ramp at -15% measuring 12 ft. x 16 ft. was chosen to access the underground. The portal location was selected near an existing outcrop area. The ramp layout from surface to the 500 or bottom most level is shown on plan MG-2, Vol.II.

V - 6.2 Mine Development

The Magusi development will entail the ramp and level development indicated on plans MG-2 and MG-3, Vol.II. The development heading sizes, were selected in accordance with the necessary clearances required for the planned equipment sizes and services space required.

A complete list of the development requirements for the Magusi underground is outlined level by level in Table M-4 that follows. The performance rates and estimated unit cost's are included in Section V., and the schedule of development and operating cost's is included in Appendix III.

TABLE M-4

MAGUSI PROPERTY
DEVELOPMENT REQ.S

LEVEL	RAMP 12'x16'	ACC.DR. 10'x13'	ACC.DR. 8'x8'	DR.PTS. 10'x13'	ORE.DR. 10'x13'	SLASH TONS	SLOT.RSE. 6'x6'	VENT.RSE. 6'x8'
100	1250	130	-	-	955	2070	130	120
200	550	160	40	515	760	2535	110	120
250	400	100	-	-	575	3800	45	60
300	500	90	50	-	390	2600	45	60
350	450	50	50	-	415	1380	45	60
400	350	240	-	-	210	-	45	60
450	270	90	-	-	200	-	45	60
500	680	60	-	265	170	-	45	60
SUMP	100							
TOTALS	4550	920	140	780	3675	12385	510	600

V - 6.3 Mining Methods

The Magusi orebody geometry will necessitate the use of two mining methods. The upper section (surface to 200 ft. level) is quite wide and will be mined by blasthole stoping using 6.5 "diameter drill holes. Plans MG-4 and MG-5, Vol. II indicate the mining methods that will be used.

A.) BLASTHOLE STOPING

The blasthole stoping will be used to recover approx. 54% of the Magusi reserves. The sequence will be as follows;

- 1.) Access the 100 ft. level via the ramp and drive drill drifts on this level.
- 2.) Access the 200 ft. level and drive the undercut drifts and drawpoints.
- 3.) Drill and blast initial undercut on the 200 ft. level by long hole to reduce brow damage and start stope.
- 4.) Drill balance of stope from the 100 ft. level using I.T.H. drilling 6.5 " holes.
- 5.) Open stope up by blasting to the west extremity of the zone then progressing towards the east along the footwall contact.
- 6.) Following the mining of the 100-200 block or when this block is well advanced and the overburden stripping is completed, the crown pillar can be drilled from surface and blasted with mucking being done from the 200 level drawpoints.

A remote control scooptram will be used for mucking when required.

B.) SUBLEVEL RETREAT

The remaining reserves from the 200 ft. level to the 500 ft. level will be mined using the sublevel longhole retreat method. The longholes (2.5" dia.) are drilled at about 70 degrees from horizontal instead of vertical as this affords better brow conditions for the blasters and mucking crews. The narrow widths below the 200 ft. level are well suited to this method.

Sublevels are driven off of the ramp at 50 foot intervals giving an effective drilling length of about 45 feet. Slot raises (6'x 6') are driven at the west end of the zone between the sublevels to create an opening to blast to. Then longhole drilling can be initiated and once enough drilling is completed, loading, blasting and mucking can begin retreating from west to east. Within a short period of time, several sublevels are developed and are available for production.

V - 6.4 Production Rate

Production from the two stoping methods are combined roughly on an equal basis throughout the mine life as shown on the operating schedule.

While it is apparent that the blasthole stoping could be mined at a faster rate quicker, relying entirely on the sublevel retreat for 100% of production would be risky.

At a production rate of 1070 T.P.D. on a 21 day month, or 750 T.P.D. mill capacity, this mine will produce for about 4.5 years. Increased production could be realized by operating a full 30 days per month, increasing production to 30,000 T.P.M. and reducing mine life to 3 years.

The additional adjacent zones of the Magusi orebody will be easily accessed once the ramp system has been driven. Increases in copper prices will certainly prompt development of these additional reserves since access is already in place.

V - 6.5 Mining Dilution

As section 3.2 and Table M-3 show, the average recovery of 90% and dilution of 20% is estimated for Magusi.

As the mining reserves show, a higher dilution rate was used in the upper blocks, where leaching of the zone was recorded and low core recoveries were obtained.

The resultant dilution lowered the expected grade from 6.71% Zn to 6.44% Zn.

Particular attention to blast design will help control dilution due to the potentially weak hanging wall. Since the zinc zone is being mined, the hanging wall will for a good part consist of massive sulphides which should present fair ground conditions. Recovery and dilution factors from 14 different mines are listed in Table M-4 which follows.

V - 6.6 Ground Control

The diamond drilling of the Magusi orebody indicated that the upper part of the ore has been leached. It was also indicated in the reserve report by Mr. U. Jarvi (Noranda) that due to the flat dip of the zones, that the schist hanging wall could be problematic. In the case of the zinc zone, the hanging wall will be in massive sulphides which is considered as fair ground.

To provide some support on the hanging wall, a "cable" drift is driven in the hanging wall of the zone as the ramp is driven towards the 100 ft. level. Drilling using a longhole drill and subsequent cablebolting using 5/8" dia. cables will be completed along the hanging wall at this elevation. Drill holes will also be drilled from surface and cables installed in the hanging wall also. Note that these cables are installed prior to opening any stopes to provide initial support and consequently minimize dilution.

It is also planned to install wire type extensometers in both the hanging wall and the crown pillar for monitoring during the mining.

Blasting design will be limited to 200 lbs./delay in order to maintain peak particle velocities to within 5 in./sec. at 100 feet. This will help in conserving in-situ strength which is often affected, due to inattention to ground vibrations resulting from blasting.

Standard mechanical rockbolts, screening and straps will be used in all development headings.

TABLE M-4

RECOVERY & DILUTION FIGURES

<u>COMPANY</u>	<u>MINING METHOD</u>	<u>% RECOVERY</u>	<u>% DILUTION</u>
1	BLASTHOLE	100	20
2	BLASTHOLE	98	59
3	LONGHOLE	95	30
4	BLASTHOLE	95	25
5	LONGHOLE	90	10
6	BLASTHOLE	90	20
7	LONGHOLE	80	20
8	BLASTHOLE	100	10
9	BLASTHOLE	90	10
10	BLASTHOLE	95	10
11	BLASTHOLE	95	20
12	BLASTHOLE	95	15
13	S.L. RETREAT	95	20
14	LONGHOLE	95	10

The above figures are published figures of recovery and dilution taken from a C.I.M. publication.

*Many factors
cause the variation
of dil. → H.W. characteristic,
width of ore,
etc.*

V - 6.7 Mine Services

V - 6.7.1 Ventilation

The mine ventilation for Magusi is of course dependant on the equipment utilised underground. At Magusi, the selected equipment may be listed as follows:

- 1.) EJC430 - 30 Ton Low Profile Trucks ✓
- 2.) EJC210 - 5 Yd. Scooptrams ✓
- 3.) EJC100 - 2 Yd. Scooptrams ✓
- 4.) EJC955 - Service Vehicle ✓
- 5.) JUMBO MJM-3B - Drill Jumbo. ✓

From the maximum equipment expected underground at any time, the ventilation air requirement can be established as listed below:

<u>EQUIPMENT</u>	<u>NO.</u>	<u>H.P.</u>	<u>C.F.M.</u>	<u>% VOL.</u>	<u>C.F.M.TOTAL</u>
EJC430 T	1	277	24,000	100	24,000
EJC430 T	1	277	24,000	75	18,000
EJC210 S	1	231	20,000	50	10,000
EJC210 S	1	231	20,000	50	10,000
EJC100 S	1	116	10,000	50	5,000
EJC955 SER.	1	40	4,500	50	2,250
MJM-3B J	1	78	9,000	50	<u>4,500</u>
				TOTAL	73,750
<u>PLUS</u> 250 c.f.m. per man x 25 max./sh.					<u>6,250</u>
TOTAL					80,000

For the Magusi, the main ventilation circuit once the development is completed, will be down the ventilation raise and up the ramp. At the various levels, air is accessed via the raise and forced into the levels with auxiliary fans. The used air will flow back to and exhaust up the ramp to surface. The static pressure and fan horsepower can be determined as follows:

<u>DESCRIPTION</u>	<u>FACTOR</u>	<u>RAISE</u>	<u>RAMP</u>
Resistance	K	150	165 (from tables)
Perimeter	P	24'	56'
Length	L	510'	4,000'
Area	A	36	192 (sq.ft.)

From the above factors, the resistance can be calculated;

$$R = KPL / 5.2A^3$$

$$R(\text{Raise}) = 7.57$$

$$R(\text{Ramp}) = \underline{1.00}$$

$$\text{TOTAL} = 8.57$$

Therefore;

$$H_f = 8.57 \times (100/100) = 8.57 \text{ "w.g.}$$

$$\text{Air H.P.} = 80,000 \times 5.2 \times 8.57 / 33,000 = 108$$

$$\text{Elec.H.P.} = 108 / .70 \text{ Eff.} = 154 \text{ Say } \underline{150 \text{ H.P.}}$$

To meet this duty, a fan was selected which provides the following;

<u>C.F.M.</u>	<u>S.P.</u>
80,000	9.6"
90,000	8.0"

The fan curve is included on the following page for reference. Since this fan is a main ventilation fan, it will be equipped with a reversible starter as required by the mining regulations. Detailed cost's of the fan and starter are provided in the Section VII.

V - 6.7.2 Mine Air Heating

Due to the site location, a propane type mine air heating unit is recommended. This system can be sized as follows;

Heating Range -35 to 34 Deg.F.

$$\begin{aligned} \text{B.T.U./HR.} &= Q \times 1.08 \times (T_a - T_b) \\ &= 80,000 \times 1.08 \times (34 - (-35)) \\ &= 5,961,600 \end{aligned}$$

At 90,000 C.F.M.

$$\text{B.T.U./HR.} = 6,706,800$$

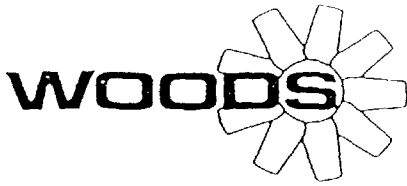
Therefore select a 7 M.M.B.T.U./HR. heating unit.

Fuel costs can be estimated as follows

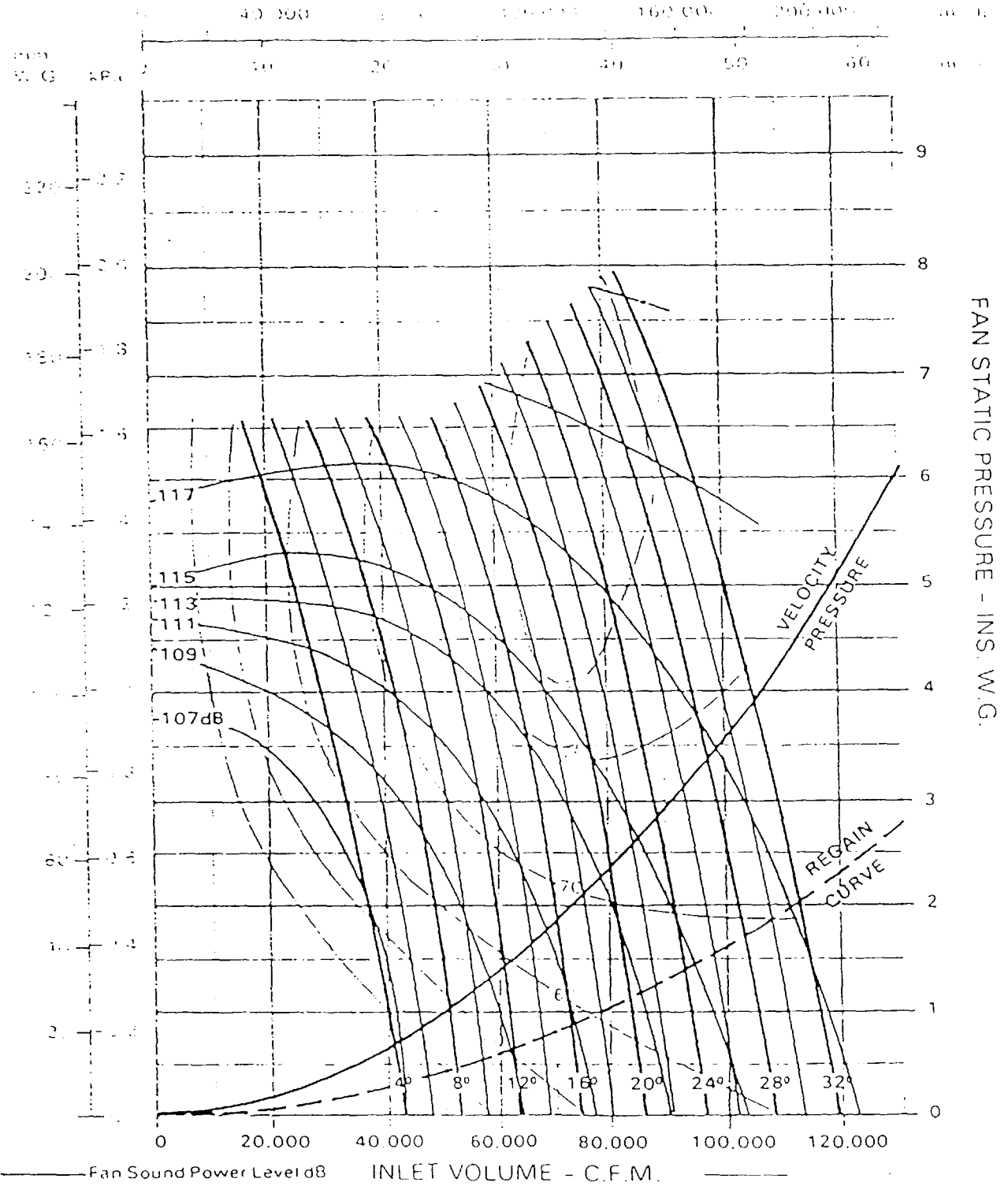
$$\text{GAL./MO.} = 6 \text{ M.M.B.T.U./HR} \times 18 \text{ HR} \times 30 \text{ D} / 110,000 = 29,455$$

$$\text{COST/YR.} = 29,455 \times 6 \text{ MO.} \times \$0.70/\text{GAL.} = \$123,711$$

$$\text{COST/MO.} = \$123,711 / 12 = \$10,309$$



Woods Aerofan Fan
 Diam 50 in (1250 mm)
 Speed 1765 rev/min
 Frequency 60Hz
 Code 50JG



Pitch Angle	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
Peak B H.P.	32.8	39.4	46	53.3	61	69	78	86	97	107	117	129	140	154	168

For Motor details see page 12
 Spectrum Reference H5 See page 10 for spectrum details

Air Density 0.075 lbs/ft³
 Max Free Discharge 120,000 CFM
 Max Duty 95,000 CFM @ 6 ins SWG

V - 6.7.3 Power

As indicated on the surface plan, an extension line from the main substation will be required. This line will be at 4160 V and this will be reduced via a transformer to 575 V before entering the underground. Initially, temporary power will be feed via the ramp and later, a permanent power line will be installed in the ventilation-escapeway raise.

V - 6.7.4 Compressed Air

The compressed air requirements for Magusi can be established as follows:

<u>EQUIPMENT DESC.</u>	<u>C.F.M.REQ'D</u>
Jumbo Drill	1,000 ?
I.T.H. Drill	900 (High Press.)
L.H. Drill (2)	710
Airlegs (4)	520
Misc.	<u>223</u>
TOTAL	2,453

The I.T.H. drilling will be carried out using an independant high pressure compressor.

For standard mine air at 100 p.s.i.g., two 1500 C.F.M. compressors would be used. ~~The screw~~ screw type compressors would be used given the relatively short mine life. ^S

V - 6.7.5 Mine Dewatering

The main mine pumping system will be set-up at the bottom of the ramp, where the main sump is established. The main 6" pumpline will be installed in the vent-escapeway raise to reduce resistance. The pump system will consist of a Mather & Platt type pump with a capacity of 250 I.G.P.M. at 900 ft. head. The discharge line will feed the water to a surge basin on surface and if acidic, the water will be pumped to the treatment plant.

V - 6.7.6 Communications

An underground telephone system will be established by feeding the line down the vent-escapeway raise with pager type telephones installed near the ventilation raise location at each level. With this arrangement, communication will be possible at all times underground from a fresh air base which will prove vital if underground rescue operations are required.

V - 7 Metallurgy

Metallurgical testwork for Magusi ore was carried out by Noranda and a senior Noranda metallurgist designed the flowsheet in conjunction with Orocon Inc. The metallurgical section of this report is covered in a companion report by K. Hester, P. Eng.

The metal recoveries has been estimated as follows:

Copper	45%
Zinc	85%
Gold	36%
Silver	15%

V - 8 Plant

Because of the proximity of the Magusi and Hebecourt properties, they will share a common surface infrastructure.

This infrastructure will consist of an office-dry complex, garage-service building, powder and cap magazines, water treatment plant, fuel storage facilities, main power line and substation.

After mining of the Magusi has been completed, some of the underground equipment will be available for Hebecourt or other projects.

The surface plan M-3, Vol. II shows the general arrangement of the buildings, roads and other infrastructure. Because of the distance from either portal, a service van is provided for transportation of the men.

V - 9 Cost Estimates

V - 9.1 Capital Costs

The capital costs to be incurred for the Magusi property may be summarized as follows:

<u>DESCRIPTION</u>	<u>COST</u>
Site Prep, Roads, Dams	780,000 ✓
Surface Plant	2,361,000 ✓
Surface Equipment	475,000 ✓
U/G Installations	524,000
U/G Equipment	<u>36,000</u>
TOTAL	\$4,176,000

Details of the capital cost's are presented in Appendix I that follows.

As noted in the detailed cost's, the major underground mine equipment is acquired through lease purchase type agreements based on a monthly rate of 5% of the new purchase price and acquired over a two year period. A salvage value has also been included in the cash flow and is shown in the detailed cost's. Of the total capital, there is a credit shown in year 6 of \$362,000 that is the Hebecourt share of the water treatment plant cost.

V - 9.2 Pre-Production Costs

The summary of pre-production costs may be presented as follows. The details of the costs are given in Appendix I also.

These costs are also indicated in the schedule of operating cost in Appendix III, and include costs incurred in year 1.

<u>DESCRIPTION</u>	<u>COST</u>
Site Preparation	540,000
Overburden Removal	2,836,000
U/G Development	2,876,000
General Mine Expense	520,000
Plant Expense	502,000
Administration	204,000
TOTAL	\$7,478,000

Capital

Site prep, roads, dams 780,000
 Surf Plant 2,361,000
 Surf Equip 475,000
 U/G Inst. 524,000
 U/G Pump 36,000
 \$4,176,000

\$ 11,654,000

V - 9.3 Operating Costs

The Magusi operating costs are summarized below. The operating costs are shown in detail in Appendix II and in the schedule of operating costs in Appendix III. Detailed units costs are available from Section V "Development and Production Cost Estimates" and from Section VI "Equipment Operating Cost Estimates".

Summary Operating Costs

<u>Description</u>	<u>Cost/Ton</u>
Mining	\$17.29 ←
Milling	15.00 17.00
Plant	3.17
Administration	3.49
Trucking	6.50 8.00
TOTAL	\$45.45 2.00 1.50 <u>\$48.95</u>

Appendix I

Capital Costs

MAGUSI

CAPITAL COSTS SUMMARY

1.) SITE PREP, ROADS, DAMS

	<u>COSTS</u>
SEDIMENTATION BASIN: 40000YDS @ \$2.50 ^{3.00} /YD.	<u>100,000</u> ← 120,000
SEWAGE DISPOSAL: PUMP STA., TILES.	50,000
FUEL STORAGE: TANK AND BASIN	20,000
SITE FENCING: 4000FT. @ \$25/FT.	100,000
DOMESTIC WATER: LINE, PUMPHOUSE,	20,000
ROAD ACCESS: CULVERTS, ROADWAY	210,500
SITE PREPARATION:	50,000
RAW WATER SUPPLY:	30,000
O.B. STORAGE AREA-DAM	<u>200,000</u>
SUB-TOTAL	\$ <u>780,000</u> ✓

2.) SURFACE PLANT

HYDRO LINE: 25 KV. - 20 KM.	600,000 *
SUBSTA. AND SWITCHGEAR	250,000 *
MINE OFFICE: BLDG. & FURNISHINGS	186,000 *
GARAGE & SERVICE BLDG.	275,000 *
TELEPHONE SYSTEM	40,000
POWDER & CAP MAGAZINES	22,000
WATER TREATMENT PLANT	624,000
COLD STORAGE BLDG.	24,000
HYDRO LINE EXTENSION: MAGUSI	42,000
SITE POWER DISTRIBUTION	200,000
COMPRESSOR ROOM BLDG.	30,000
MINE VENTILATION FAN: MAIN FAN	35,000
MINE AIR HEATING SYSTEM	<u>33,000</u>
SUB-TOTAL	\$ 2,361,000

780,000
2361,000
475,000
529,000
30,000 / KM.
1500KVA

3.) SURFACE MOBILE & STATIONARY EQUIPMENT

	<u>COST</u>
<u>MOBILE</u>	
LOADER CAT. 936	140,000
AMBULANCE	35,000
GRADER	100,000
SERVICE VAN - 15 MAN	20,000
1/2 TON PICKUPS (2)	<u>30,000</u>
SUB-TOTAL	\$ 325,000
<u>STATIONARY</u>	
COMPRESSORS L.P. 2 @ 1500 C.F.M.	<u>150,000</u>
TOTAL	\$ 475,000

4.) UNDERGROUND INSTALLATIONS

U/G POWER DISTRIBUTION	320,000
VENT. DOORS AND BULKHEADS	80,000
AUXILIARY VENTILATION FANS	24,000
PUMPS AND SUMPS	<u>100,000</u>
SUB-TOTAL	\$ 524,000

5.) UNDERGROUND EQUIPMENT

UNDERGROUND EQUIPMENT- NON LEASE	36,000
UNDERGROUND EQUIPMENT-LEASE	125,000/MO.

LEASE BASED ON CAPITAL VALUE OF \$2,503,500
WITH LEASE AT 5% OF PURCHASE VALUE WITH
WRITEOFF OF 2 YEARS.

DETAILS OF EQUIPMENT UNIT PRICES ARE LISTED
FURTHER IN THIS SECTION.

MAGUSI

CAPITAL COST DETAILS

✓ 1.) SITE PREP. ROADS & DAMS

A.) ROAD ACCESS & CULVERTS

ROAD ACCESS-MAX. (ALT.2) 5100 FT.

-1.56 KM. @ \$100,000/KM = \$156,000

ROAD UPGRADING- 5600 FT.

-1.70 KM. @ \$25,000/KM. = 42,500

CULVERT -120 FT. 8 FT. DIA. @ \$100/FT = 12,000

TOTAL = \$210,500

✓ B.) SITE PREP.-BLDG. AREA

AREA APPROX.=400x550/10.75=20465 SQ.M.

ALLOW 20465 SQ.M. @ \$2.50/SQ.M. = \$ 50,000

C.) RAW WATER SUPPLY

-2" LINE 1000 FT. @ \$3/FT.= \$3,000

-INSTALLATION

-1000/50x2x8x\$20 = 6,400

-MAT'L (UTILIDOR) = 10,000

-PUMP & PUMP HOUSE = 10,000

TOTAL= \$30,000 = \$ 30,000

D.) O.B. STORAGE SITE

AS INDICATED ON PLAN-CONSTRUCT DAM WITH

GOOD QUALITY CLAY (TOP LAYER) EST.VOLUME

AT 23,000 YDS. EST. COST (DETAILS ON FILE) = \$200,000

E.) MINE OFFICE

BUILDING- ERECTED 50' x 100' = \$105,000

FND.S -135YDS. @ \$250/YD. = 33,750

INT.FINISH & MAT'L = 47,000

TOTAL = \$185,750----- = \$185,750

COLD STOR.-40'x 60' @ \$10/SQ.FT. = \$ 24,000

F.) GARAGE & SERVICE BUILDING

-BLDG. 40'x 100' INSTALLED	= \$127,000
-FND. 150YDS. @ \$250/YD.	= 37,500
-GARAGE DOORS 3 @ \$3000	= 9,000
-O.H. CRANE 5 TON	= 25,000
-SHOP TOOLS & EQUIP. LOT	= <u>75,000</u>

TOTAL = \$273,500 SAY \$275,000

G.) TELEPHONE SYSTEM

20 KM. OF LINE @ \$2000/KM = \$ 40,000

H.) POWDER & CAP MAGS.

RENTAL COST OF \$685/MO. ON 2 YR.
W.O. -\$685 x 24 MO. = 16,440

CAP. MAG. -\$200/MO. x 24MO. = 4,800

TOTAL = \$ 21,240 SAY \$22,000

I.) POWER LINE EXTENSION

4500 FT. = 1.4 KM. @ \$30,000/KM. = \$ 42,000

J.) SITE POWER DISTRIBUTION

INC. CABLES, STARTERS, SWITCHES,
M.C.C. 1 LOT = \$200,000

K.) COMPRESSOR ROOM

SHELTER FOR COMP. AT PORTAL SITE

-30'x 50' @\$20/SQ.FT. = \$ 30,000

L.) U/G VENTILATION

-FAN & STARTER = \$ 23,340
-COLLAR & FAN HOUSE = \$ 10,875

TOTAL = \$ 34,215 SAY \$35,000

M.) MINE AIR HEATING

-7 M.B.T.U./HR. HEATER UNIT = \$33,000

N.) U/G POWER DISTRIBUTION

-8 LEVEL @ \$40,000/LV. = \$320,000

O.) VENT. DOORS, BKH., AUX. VENT.

-8 LEVELS @ \$10,000/LV. = \$ 80,000
-3 FANS 25K.C.F.M. @ \$8000EA. = \$ 24,000

TOTAL = \$104,000

P.) PUMPS & SUMPS

-ALLOW 2 PUMPS AT 125 H.P., 250
G.P.M. & 900 FT. HEAD
-MATHER & PLATT @ \$30,000EA. =\$ 60,000

-CLEAN & DIRTY WATER SUMPS
INC. CONCRETE, WALL, VALVES
LOT. =\$ 40,000

TOTAL =\$100,000

Q.) U/G EQUIPMENT

<u>ITEM</u>	<u>NO.</u>	<u>UNIT COST</u>	<u>TOTAL COST</u>	<u>UNIT LEASE</u>	<u>TOTAL LEASE</u>
30T TRUCK	3	\$264,000	\$792,000	\$13,200	\$39,600
5YD.SCOOP	3	264,000	792,000	13,200	39,600
(REM.CTL)	1	31,500	31,500	1,575	1,575
2YD.SCOOP	1	163,000	163,000	8,150	8,150
SER.VEH.	2	60,000	120,000	3,000	6,000
I.T.H.DR.	1	160,000	160,000	7,750	7.750
COMP.H.P.	1	130,000	130,000	6.500	6.500
L.H.DR.	1	65,000	65,000	3,500	3.500
JUMBODR.	1	250,000	<u>250,000</u>	12,500	<u>12,500</u>
		TOTAL	\$ 2,503,500		\$125,175

*LEASE RATE AT 5% OF PURCHASE PRICE WITH
2 YEAR W.O.

OTHER U/G EQUIPMENT (NON-LEASE)

<u>ITEM</u>	<u>NO.</u>	<u>UNIT COST</u>	<u>TOTAL COST</u>
AIRLEGS	10	\$3,000	\$30,000
FACEPUMPS	2	\$3,000	<u>\$ 6,000</u>
		TOTAL	=\$36,000

EQUIPMENT SALVAGE VALUE

While the equipment salvage value is difficult to evaluate with precision, an approximation can be done as follows.

Note that this value assumes that the equipment is operated normally and is serviced regularly by the owners.

<u>UNIT</u>	<u>NO.</u>	<u>RES.VALUE</u>	<u>REPAIR COST</u>	<u>NET RES.VALUE</u>
30T TRUCK	3	\$132,000	\$ 40,000	\$276,000
5YD.SCOOP	3	132,000	40,000	276,000
2YD.SCOOP	1	81,500	24,000	58,000
SER.VEH.	2	30,000	10,000	40,000
I.T.H.DR.	1	80,000	24,000	56,000
COMP.H.P.	1	65,000	20,000	45,000
JUMBO DR.	1	125,000	38,000	87,000
L.H.DR.	1	32,500	10,000	<u>23,000</u>
			TOTAL	= \$861,000

*RESIDUAL VALUE EST. AT 50% OF ORIG.PRICE

*REPAIR COST EST. AT 15% OF ORIG. PRICE

*RES.VALUE-REPAIR COST=NET RES. VALUE

Therefore, the residual or salvage value of the u/g equipment is estimated to be about \$861,000 at the end of the project life of 5 years. This value is credited to Magusi in the cash flow.

MAGUSI

PRE-PRODUCTION DEVELOPMENT

SUMMARY

<u>DESCRIPTION</u>	<u>COST</u> \$
SITE PREPARATION	\$ 540,000
O.B. STRIPPING	2,835,000
U/G DEVELOPMENT	2,876,000 -
GENERAL MINE EXPENSE	520,000
PLANT EXPENSE	502,000
ADMINISTRATION	<u>204,000</u>
TOTAL	\$ 7,478,000

PRE-PRODUCTION DEV. DETAILS

1.) SITE PREPARATION.

DETAILED ENG.- 100 MANDAYS @ \$500 (INC. ENVIR. STUDY)	=\$ 50,000
ROCK MECH. STUDY LAB. & EQUIP.	=\$ 50,000
GEOTECH. STUDY LAB. & EQUIP.	=\$ <u>50,000</u>
TOTAL	=\$150,000

2.) SITE CLEARING

APPROX. 220 AC. @ \$1200/AC.	=\$264,000
DITCHING-STKPILE AREA 1200 FT. -ROADS <u>5100</u> FT.	
TOTAL 6300 FT. @ \$20/FT.	=\$ <u>126,000</u>
TOTAL	=\$390,000

3.) O.B. STRIPPING

810,000 CU. M. @ \$3.50/CU.M.	=\$2,835,000
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4.) U/G DEV., G.M.E. & ADMIN.

PLEASE SEE SCHEDULE OF OPERATING COSTS APPENDIX III.

APPENDIX II

OPERATING COSTS

MAGUSI

OPERATING COST DETAILS

(1,073,800 TONS)

<u>1.) MINING-DEVELOPMENT</u>	<u>TOTAL COST</u>	<u>COST/TON</u>
RAMP 2720FT.@	\$311.58	847,498
ACC.DR. 410FT.@	\$250.53	102,717
DR.PTS. 265FT.@	\$250.53	66,390
VENT-ESC. 360FT.@	\$490.16	176,458
ACC.DR. 100FT.@	\$220.01	22,001
ORE DR. 1960FT.@	\$265.91	521,184
SLOTARSE. 270FT.@	\$165.62	44,717
SLASHORE 7780 T.@	\$10.64	82,779
TRAM WST.53910 T.@	\$4.04	217,796
TOTAL	\$2,081,540	-----\$ 1.94

MINING-PRODUCTION

L.H.DR. -265,070FT.@	\$3.40	901,238
L.H.BLAST -477,000 T.@	\$2.18	1,039,860
L.H.MUCK -477,000 T.@	\$1.73	825,210
I.T.H.DR. - 97,515FT.@	\$4.73	461,246
I.T.H.BL. -596,800 T.@	\$1.30	775,840
I.T.H.MUCK-596,800 T.@	\$1.73	1,032,464
TRAM ORE 1,073,800 T.@	\$4.04	4,338,152
STKP.REC. - 33,197 T.@	\$1.50	49,796
TOTAL	\$9,423,806	-----\$ 8.78

GENERAL MINE EXPENSE

PER MO.

LABOUR	\$102,750
MATERIAL	45,000
TOTAL	\$147,750-----\$ 6.57

TOTAL MINING-----\$17.29

2.) MILLING

AREA MILLING V.TOWN -----\$15.00

3.) PLANT

PER MO.

-LABOUR	\$26,670-----\$ 1.19
-HYDRO	31,500-----\$ 1.40
-MATERIALS	13,000-----\$ 0.58

4.) ADMINISTRATION

PER MO.

-LABOUR	\$21,600-----\$ 0.96
-MATERIALS	56,800-----\$ 2.53

5.) TRUCKING -CONTRACT BY T.N.O. -----\$ 6.50

GRAND-TOTAL \$45.45

APPENDIX III
SCHEDULE OF OPERATING COSTS

MAGUSI90

PROJECT: MAGUSI PROJECT
SUMMARY OF INVESTMENT, OPERATING COSTS & PRODUCTION
(,000 \$)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PRODUCTION									
- TONS MILLED	0	204,000	272,000	272,000	272,000	87,000	0		1,107,000
PRODUCTION (IN CONCENTRATE)									
- COPPER (LBS X 1000)	0	1	1	1	1	0	0		3
- ZINC (LBS X 1000)	0	22	30	30	30	10	0		121
- GOLD (OUNCES X 1000)	0.000	0.005	0.006	0.006	0.006	0.002	0.000		0.025
- SILVER (OUNCES X 1000)	0	0	0	0	0	0	0		0
OPERATING COSTS									
- MINING	0	5,905	5,938	4,268	4,255	1,107	0		21,474
- MILLING	0	3,060	4,080	4,080	4,080	1,305	0		16,605
- PLANT	0	855	855	855	855	214	0		3,636
- ADMINISTRATION	0	805	941	941	941	273	0		3,899
- TRUCKING	0	1,326	1,768	1,768	1,768	566	0		7,196
TOTAL OPERATING COSTS	0	11,951	13,582	11,912	11,899	3,465	0		52,809
CAPITAL & PREPROD. DEV.									
- CAPITAL (EXPANSION)	3,452	724				(362)			3,814
- CAPITAL (ONGOING)						(861)			(861)
- DEFERRED DEVELOPMENT	6,060	1,418							7,478
TOTAL CAPITAL & PPD	9,512	2,142		0	0	(1,223)	0		10,431
OPERATING COSTS PER TON									
- MINING	0.00	28.95	21.83	15.69	15.64	12.73			19.40
- MILLING	0.00	15.00	15.00	15.00	15.00	15.00			15.00
- PLANT	0.00	4.19	3.15	3.15	3.15	2.46			3.28
- ADMINISTRATION	0.00	3.94	3.46	3.46	3.46	3.14			3.52
- TRUCKING	0.00	6.50	6.50	6.50	6.50	6.50			6.50
TOTAL COSTS PER TON	0.00	58.59	49.93	43.79	43.75	39.82			47.70
MANPOWER									
- MINE DIRECT	19	27	30	9	9	3	0		
- MINE SUPPORT	11	46	46	23	23	5	0		
- PLANT	4	16	16	8	8	2	0		
- ADMINISTRATION	2	7	7	4	4	2	1		
TOTAL SITE MANPOWER	36	96	99	44	44	12	1		

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SCHEDULE OF MINING WORK

DESCRIPTION OF WORK	UNITS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PORTAL		1	0	0						1
1.RAMP (12x16)	FEET	1,800	1,350	1,370	0	0				4,520
2.ACC.DR.(10x13)	FEET	290	240	390	0	0				920
3.DR. POINTS(10x13)	FEET	515	0	265	0					780
4.VENT.&ESC. RSE. (6x8)	FEET	240	180	180	0	0				600
5.ACC.DR. (8x8)	FEET	40	100							140
6.ORE DR. (10x13)	FEET	1,715	1,380	580	0	0				3,675
7.SLOT RSE. (6x6)	FEET	240	135	135	0	0				510
8.SLASH ORE	TONS	4,605	7,780	0	0	0				12,385
9.L.H. DRILLING (2.5")	FEET	0	16,670	72,800	87,800	87,800	0	0		265,070
10.L.H. BLASTING	TONS	0	30,000	131,000	158,000	158,000	0	0		477,000
11.L.H. MUCKING	TONS	0	30,000	131,000	158,000	158,000	0	0		477,000
12.I.T.H.DRILLING (6.5")	FEET	0	23,000	23,050	18,625	18,625	14,215	0		97,515
13.I.T.H. BLASTING	TONS	0	140,800	141,000	114,000	114,000	87,000	0		596,800
14.I.T.H. MUCKING	TONS	0	140,800	141,000	114,000	114,000	87,000	0	0	596,800
15.TRAM WASTE	TONS	37,810	24,720	29,190				0	0	91,720
16.TRAM ORE	TONS	33,197	170,800	272,000	272,000	272,000	87,000	0	0	1,106,997
17.STKPILE REC.	TONS		33,197							33,197
18.CABLE BOLTING	UNITS	1	0	0						1
SURFACE WORK			0	0						0
-ENG.& SOILS	UNITS	1								1
-CLEAR SITE	UNITS	1								1
-STRIP O.B.	CU.M.	405,000	405,000							810,000
EQUIPMENT RENTALS	MONTHS	6	12	6						24
WATER TREATMENT	MONTHS		4	8	8	6	2			28

SCHEDULE OF UNDERGROUND WORK COSTS

DESCRIPTION OF WORK	RATE PER UNIT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PORTAL	240,000	240 ✓	0	0	0	0	0	0	0	240
1.RAMP (12x16)	311.58	561 ✓	421	427 ✓	0	0	0	0	0	1,408
0		0	0	0	0	0	0	0	0	0
2.ACC.DR.(10x13)	250.53	73 ✓	60	98 ✓	0	0	0	0	0	230
0		0	0	0	0	0	0	0	0	0
3.DR. POINTS(10x13)	250.53	129 ✓	0	66 ✓	0	0	0	0	0	195
0		0	0	0	0	0	0	0	0	0
4.VENT.&ESC. RSE. (6x8)	490.16	118 ✓	88	88 ✓	0	0	0	0	0	294
0		0	0	0	0	0	0	0	0	0
5.ACC.DR. (8x8)	220.01	9 ✓	22	0	0	0	0	0	0	31
0		0	0	0	0	0	0	0	0	0
6.ORE DR. (10x13)	265.91	456 ✓	367	154 ✓	0	0	0	0	0	977
0		0	0	0	0	0	0	0	0	0
7.SLOT RSE. (6x6)	165.62	40 ✓	22	22 ✓	0	0	0	0	0	84
0		0	0	0	0	0	0	0	0	0
8.SLASH ORE	10.64	49 ✓	83	0	0	0	0	0	0	132
0		0	0	0	0	0	0	0	0	0
9.L.H. DRILLING (2.5")	3.40	0	57	248 ✓	299	299	0	0	0	901
0		0	0	0	0	0	0	0	0	0
10.L.H. BLASTING	2.18	0	65	286 ✓	344	344	0	0	0	1,040
0		0	0	0	0	0	0	0	0	0
11.L.H. MUCKING	1.73	0	52	227 ✓	273	273	0	0	0	825
0		0	0	0	0	0	0	0	0	0
12.I.T.H.DRILLING (6.5")	4.73	0	109	109 ✓	88	88	67	0	0	461
0		0	0	0	0	0	0	0	0	0
13.I.T.H. BLASTING	1.30	0	183	183 ✓	148	148	113	0	0	776
0		0	0	0	0	0	0	0	0	0
14.I.T.H. MUCKING	1.73	0	244	244 ✓	197	197	151	0	0	1,032
0		0	0	0	0	0	0	0	0	0
15.TRAM WASTE	4.04	153	100	118	0	0	0	0	0	371
0		0	0	0	0	0	0	0	0	0
16.TRAM ORE	4.04	134	690	1,099	1,099	1,099	351	0	0	4,472
0		0	0	0	0	0	0	0	0	0
17.STKPILE REC.	1.50	0	50	0	0	0	0	0	0	50
0		0	0	0	0	0	0	0	0	0
18.CABLE BOLTING	100,000	100 ✓	0	0	0	0	0	0	0	100
0		0	0	0	0	0	0	0	0	0
SURFACE WORK		0	0	0	0	0	0	0	0	0
-ENG.& SOILS	*****	150 ✓	0	0	0	0	0	0	0	150
-CLEAR SITE	*****	390 ✓	0	0	0	0	0	0	0	390
-STRIP O.B.	3.50	1,418 ✓	1,418	0	0	0	0	0	0	2,835
EQUIPMENT RENTALS	*****	750 ✓	1,500	750 ✓	0	0	0	0	0	3,000
WATER TREATMENT	6500.00	0	26	52 ✓	52	39	13	0	0	182
TOTALS		4,768	5,556	4,171	2,501	2,488	695	0	0	20,178

SCHEDULE OF SUPERVISION AND LABOUR OVERHEADS

DESCRIPTION OF WORK		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
-MINE ENGINEER		1,040	2,080	2,080	2,080	2,080	520	0		9,880
-PROJECT ENGINEER	HOURS									0
-MINE GEOLOGIST	HOURS	1,040	2,080	2,080	2,080	2,080	520	0		9,880
-ASSIST. GEOLOGIST	HOURS		2,080	2,080	2,080	2,080	520	0		8,840
-TECHNICIAN 1	HOURS	1,040	2,080	2,080	2,080	2,080	520	0		9,880
-TECHNICIAN 2	HOURS	1,040	2,080	2,080	2,080	2,080	520	0		9,880
-TECHNICIAN 3	HOURS	1,040	2,080	2,080	2,080	2,080	520	0		9,880
-TECHNICIAN 4	HOURS		2,080	2,080	2,080	2,080	520	0		8,840
-MINE SHIFTBOS	HOURS	2,080	6,240	6,240	6,240	6,240	520	0		27,560
-MINE TRAINER	HOURS		2,080	2,080	2,080	2,080	520	0		8,840
-MECHANIC	HOURS	3,120	12,480	12,480	12,480	12,480	3,120	0		56,160
-ELECTRICIAN	HOURS	1,040	4,160	4,160	4,160	4,160	1,040	0		18,720
-OTHER TRADES	HOURS		2,080	2,080	2,080	2,080	520	0		8,840
-MINER 1	HOURS		4,160	4,160	4,160	4,160	1,040	0		17,680
-MINER 2	HOURS		2,080	2,080	2,080	2,080	520	0		8,840
-MINER 3	HOURS									0
-DRY	HOURS	1,040	2,080	2,080	2,080	2,080	520			9,880
										0
										0
MONTHLY MATERIAL COSTS										0
-GEO.&ENG. SUPPLIES	MONTHS	6	12	12	12	12	3	0		57
-MINE RES.&TRAIN.	MONTHS	0	12	12	12	12	3	0		51
-	MONTHS									0
-MINE DRY	MONTHS	6	12	12	12	12	3	0		57
-MINE DEWATERING	MONTHS		12	12	12	12	3	0		51
-VENTILATION	MONTHS	6	12	12	12	12	3	0		57
-SIGNALS, TELEPHONE	MONTHS		12	12	12	12	3	0		51
-SERVICE VEH.	MONTHS	3	12	12	12	12	3	0		54
-MINERS LAMPS	MONTHS	6	12	12	12	12	3	0		57
-SMALL TOOLS	MONTHS	6	12	12	12	12	3	0		57
-LEVEL MTCE.	MONTHS	6	12	12	12	12	3	0		57
-BULKHEADS, CONST.	MONTHS	6	12	12	12	12	3	0		57
-SCOOPTRAM 2 YD.	MONTHS	3	12	12	12	12	3	0		54
-MINE AIR HEATING	MONTHS	6	12	12	12	12	3	0		57
-DEF. D.D.	MONTHS	6	12	12	12	12	3	0		57
-PIPE LINES	MONTHS	6	12	12	12	12	3	0		57
-WASTE DISPOSAL	MONTHS	6	12	12	12	12	3	0		57
-ORE HANDLING	MONTHS	6	12	12	12	12	3	0		57
-GROUTING	MONTHS	6	12	12	12	12	3	0		57
-UG.SHOP SUPPLIES	MONTHS	0	12	12	12	12	3	0		51
-OTHER	MONTHS	6	12	12	12	12	3	0		57
-CONSULTANTS	MONTHS	6	12	12	12	12	3	0		57

SCHEDULE OF SUPERVISION AND LABOUR EXPENDITURES

DESCRIPTION OF WORK	COST PER HOUR	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
-MINE ENGINEER	31.24	32	65	65	65	65	16	0	0	309
-PROJECT ENGINEER	26.47	0	0	0	0	0	0	0	0	0
-MINE GEOLOGIST	30.05	31	63	63	63	63	16	0	0	297
-ASSIST. GEOLOGIST	26.47	0	55	55	55	55	14	0	0	234
-TECHNICIAN 1	17.40	18	36	36	36	36	9	0	0	172
-TECHNICIAN 2	18.73	19	39	39	39	39	10	0	0	185
-TECHNICIAN 3	21.38	22	44	44	44	44	11	0	0	211
-TECHNICIAN 4	26.47	0	55	55	55	55	14	0	0	234
-MINE SHIFTBOSS	28.86	60	180	180	180	180	15	0	0	795
-MINE TRAINER	28.86	0	60	60	60	60	15	0	0	255
-MECHANIC	24.03	75	300	300	300	300	75	0	0	1,349
-ELECTRICIAN	25.27	26	105	105	105	105	26	0	0	473
-OTHER TRADES	24.03	0	50	50	50	50	12	0	0	212
-MINER 1	21.38	0	89	89	89	89	22	0	0	378
-MINER 2	24.03	0	50	50	50	50	12	0	0	212
-MINER 3	27.66	0	0	0	0	0	0	0	0	0
-DRY	17.40	18	36	36	36	36	9	0	0	172
0		0	0	0	0	0	0	0	0	0
0		0	0	0	0	0	0	0	0	0
MONTHLY MATERIAL COSTS		0	0	0	0	0	0	0	0	0
-GEO.&ENG. SUPPLIES	1,200	7	14	14	14	14	4	0	0	68
-MINE RES.&TRAIN.	1,000	0	12	12	12	12	3	0	0	51
-		0	0	0	0	0	0	0	0	0
-MINE DRY	500	3	6	6	6	6	2	0	0	29
-MINE DEWATERING	500	0	6	6	6	6	2	0	0	26
-VENTILATION	1,000	6	12	12	12	12	3	0	0	57
-SIGNALS, TELEPHONE	300	0	4	4	4	4	1	0	0	15
-SERVICE VEH.	5,000	15	60	60	60	60	15	0	0	270
-MINERS LAMPS	500	3	6	6	6	6	2	0	0	29
-SMALL TOOLS	1,000	6	12	12	12	12	3	0	0	57
-LEVEL MTCE.	1,500	9	18	18	18	18	5	0	0	86
-BULKHEADS,CONST.	1,000	6	12	12	12	12	3	0	0	57
-SCOOPTRAM 2 YD.	7,000	21	84	84	84	84	21	0	0	378
-MINE AIR HEATING	11,000	66	132	132	132	132	33	0	0	627
-DEF. D.O.	5,000	30	60	60	60	60	15	0	0	285
-PIPE LINES	500	3	6	6	6	6	2	0	0	29
-WASTE DISPOSAL	1,500	9	18	18	18	18	5	0	0	86
-ORE HANDLING	500	3	6	6	6	6	2	0	0	29
-GROUTING	2,500	15	30	30	30	30	8	0	0	143
-UG.SHOP SUPPLIES	1,000	0	12	12	12	12	3	0	0	51
-OTHER	1,500	9	18	18	18	18	5	0	0	86
-CONSULTANTS	1,000	6	12	12	12	12	3	0	0	57
TOTALS		520	1,767	1,767	1,767	1,767	412	0	0	8,001

SCHEDULE OF MILLING WORK

DESCRIPTION OF EQUIPMENT		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
OWNER CUSTOM MILLING	TONS	0	204,000	272,000	272,000	272,000	87,000	0		1,107,000
ORE TRUCKING TO MILL	TONS	0	204,000	272,000	272,000	272,000	87,000	0		1,107,000

SCHEDULE OF PLANT & ADMINISTRATIVE EXPENDITURES

DESCRIPTION OF WORK		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PLANT LABOUR COSTS		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-TRADESMAN 1	19.67	20	123	123	123	123	31	0	0	542
-TRADESMEN 2	20.96	22	44	44	44	44	11	0	0	207
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-EQUIP. OPERATOR	19.67	20	82	82	82	82	20	0	0	368
-LABOURER	17.04	18	71	71	71	71	18	0	0	319
PLANT MATERIAL COSTS		0	0	0	0	0	0	0	0	0
-HYDRO.POWER DIST.	0.045	0	378	378	378	378	95	0	0	1,607
-COMPRESSORS	1000.00	6	12	12	12	12	3	0	0	57
-GENERATOR	59000.00	354	0	0	0	0	0	0	0	354
-WATER, SEWAGE	500.00	0	6	6	6	6	2	0	0	26
-YARDS, ROADS	2000.00	12	24	24	24	24	6	0	0	114
-SECURITY	5000.00	30	60	60	60	60	15	0	0	285
-BLDG. MAINT., HEAT	1500.00	0	18	18	18	18	5	0	0	77
-SHOP SUPPLIES	500.00	3	6	6	6	6	2	0	0	29
-SERV. VEHICLES	1200.00	7	14	14	14	14	4	0	0	68
-LOADER, TRUCK MTCE.	1500.00	9	18	18	18	18	5	0	0	86
-		0	0	0	0	0	0	0	0	0
TOTAL PLANT COSTS		502	855	855	855	855	214	0	0	4,137
ADMINISTRATIVE		0	0	0	0	0	0	0	0	0
-ADMIN. 1	14.42	15	30	30	30	30	7	0	0	142
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-MANAGEMENT	12000.00	120	144	144	144	144	36	0	0	732
-WAREHOUSE	19.67	0	41	41	41	41	10	0	0	174
-PURCHASING	20.96	0	44	44	44	44	11	0	0	185
-TELEPHONE, TELEX	2500.00	15	30	30	30	30	8	0	0	143
-TRAVEL, ACCOM.	1500.00	9	18	18	18	18	5	0	0	86
-INSURANCE	1500.00	9	18	18	18	18	5	0	0	86
-TRAINING, SAFETY	1500.00	9	18	18	18	18	5	0	0	86
-RECRUITMENT	1000.00	6	12	12	12	12	3	0	0	57
-OFFICE SUPP.LEASES	1500.00	9	18	18	18	18	5	0	0	86
-EMPLOYEE MED.SAFETY	1000.00	6	12	12	12	12	3	0	0	57
-ALLOCATED COSTS		0	0	0	0	0	0	0	0	0
-TAXES(MUN.)	1000.00	6	12	12	12	12	3	0	0	57
-ADMINISTRATION FEE	2.00	0	408	544	544	544	174	0	0	2,214
TOTAL ADMINISTRATIVE		204	805	941	941	941	273	0	0	4,103

VI Hebecourt Property

VI - 1 Claims and Ownership

The Hebecourt property consists of Mining Lease 672, site of the earlier mine operated by Noranda, in Range 1, Hebecourt Township, Quebec. The mining lease is comprised of Lots 44,45, 46, 47 and parts of lots 48 and 49 containing in total some 555.8 acres.

The property adjoins to the east of Mining Lease 651, site of the Iso-Magusi base metal deposit covered in Section V of this report.

Deak Resources Corporation is owner of 100% of the property, subject to a 1.66% net smelter royalty held by two of the original stakers and vendors of the property.

VI - 2 Property Geology & History

VI - 2.1 Geology

The Hebecourt copper deposit is a stratiform massive sulfide deposit enclosed in a sequence of overturned, but relatively undeformed mafic pillow lavas, breccias and tuffs locally referred to as the New InSCO Basalt. This sequence stratigraphically overlies, and is partially interbedded with the New InSCO Rhyolite (NIR), a heterogeneous unit of felsic volcanoclastic rocks comprising over 75% of the alteration zone associated with the massive sulfides. Adjacent to the ore body the two units are strongly altered (chloritized and sericitized) and differentially sheared. Drill hole data indicates that chlorite is the dominant alteration product adjacent to the massive sulfides, while sericite predominates over chlorite distant from the sulfides. To the north of this altered zone the rocks are truncated by an EW-trending strike-slip fault which has the altered volcanics juxtaposed against a relatively unaltered, pillowed basaltic unit referred to as the Fabie Bay Basalt. To the south the volcanic rocks are cut by the Hebecourt Diorite and by a late quartz-feldspar porphyry sill which is intruded along the diorite-New InSCO rhyolite contact.

The partially mined Hebecourt ore deposit is a conformable lens of massive sulphide with a strike length of 300 feet in an east-northeast direction extending down dip to the South at 50° for about 600'. The ore is composed essentially of massive, fine grained pyrrhotite (65%), disseminated and finely banded chalcopyrite (9%) and pyrite(25%). Sphalerite and galena are associated with oxidized zones and make up less than 1% of the sulfides. A siliceous zone, rich in disseminated pyrite, pyrrhotite and chalcopyrite is interlayered and broadly conformable with the massive sulphide body.

The massive pyrrhotite contains both finely disseminated grains and wispy, discontinuous laminations of chalcopyrite. Layers of finely dispersed fragments of non-sulphide material are interlaminated with the sulfides. On the stratigraphic footwall narrow (less than 1") layers of continuous massive pyrite and chalcopyrite horizons lie at the contact with the sulfides and pillow lavas. This sulphide - volcanic contact is sharp but irregular, with large chloritized pillow fragments up to 3' in diameter enclosed within the massive sulfides.

Approximately 30% of the massive pyrrhotite has been subsequently altered by oxidation to pyrite which is distributed throughout the ore body in a grid-like network of conformable layers and cross-cutting veinlets. The pyrite-rich zones are usually bordered by lesser amounts of fine grained iron-rich carbonates, iron oxides and trace amounts of sphalerite and galena.

The siliceous zone is a broadly conformable unit interlayered with the massive sulfides along the stratigraphic hanging wall of the ore body. It is composed of quartz (70%), disseminated sulphide (20%) and carbonate (10%). Pyrite predominates as the most abundant sulphide (85%), followed by chalcopyrite (10%) and lesser pyrrhotite (5%). The copper values in the sulphide enriched portion of the siliceous zone are approximately the same as in the massive sulfides. This zone is interpreted as a sulphide-rich chert, later recrystallized during metamorphism into a granulated quartz zone.

A broad zone of disseminated pyrite (1-10%) envelops the ore zone and contains weakly anomalous copper and zinc.

VI - 2.2 History

Prospecting would have commenced in the general area in the late 1920's or early 1930's following discovery of the Horne (Noranda) mine. Until an airborne survey of the area in 1972, exploration was sporadic. That airborne survey resulted in discovery of the Iso-Magusi copper-zinc deposit on the property immediately west of the subject property.

Subsequent geophysical surveys and diamond drilling by the Hebecourt Syndicate resulted in discovery of the Hebecourt deposit.

In 1974 Noranda mines optioned the deposit only, not the whole property, and in 1975 developed the mine as a combined open pit and underground operation. A total of 103,574 tons of ore at 2.7% copper were reported to have been produced by 1977, the year in which the mine was closed due to low copper prices.

All the ore extracted came from the open pit. Noranda also drove a decline from surface to the 400 ft. level with six cross-cuts into the ore body at 50 ft. vertical intervals from the 150 to 400 ft. levels.

In 1987 the lease was returned to the original Hebecourt Syndicate and was acquired subsequently by Deak.

VI - 3 Ore Reserves

On March, 1989, the writer produced a report showing ore reserves of 850,000 tons averaging 2.50% Cu. including 15% dilution. Subsequent economic evaluation indicated the reserve grade was sub-economic.

The re-calculation herein deleted some lower grade material included in the previous reserves, refined the ore outlines and deleted the ore removed previously by the open pit. Based upon extensive diamond drilling on sections at 50 ft. spacing the reserves are considered to be probable and being diluted should approximate mineable grade.

As detailed in Table 1, the reserves are:

Probable, diluted 837,933 Tons @ 2.78% copper

say 840,000 Tons

In addition, there are some possible reserves in other lenses totalling some 40,000 Tons @ 3.77% copper.

VI - 3.1 Methodology

Using original drill logs and Noranda computer-produced assay values, the writer reconstructed vertical cross sections at 1 in. = 20 ft. for sections 0 + 50E to 3 + 50E encompassing all the known mineralization. Ore outlines were drawn onto these sections and are reproduced herein at 1 in. = 40 ft. (Section II)

True widths of each drill hole intersection were utilized. Projecting these values halfway to the next vertical section on strike (25 ft.) and halfway to the next drill hole on section, produces a series of ore blocks around each intersection.

On section, where continuity was evident, the ore blocks were taken half way to the next ore intercept or half way to the next non ore-grade intercept. Maximum vertical distance to the next ore intercept was 75 ft. and averaged approximately 50 ft.

While no specific cut-off factor was used, low grade sections under 2.5% copper were excluded from reserves except where used to provide continuity. One exception to this is on Section 1 + 050 E, where a low grade section was excluded as a pillar.

Reserves are calculated to elevation 300 ft. or approximately - 600 ft. from surface.

Reserves in the small tonnage "Upper" and "Lower" lenses are classified herein as possible reserves as their economic mineability has not been determined at this time.

Calculated Ore Reserve details are presented as Hebecourt - Table 1.

VI - 3.2 Ore Reserves-Mining

The geological reserve blocks were reviewed by N. Lecuyer and applicable recovery and dilution factors were estimated for each block.

Factors including block location (ie. type of ground) dip of the hanging wall or foot wall contact and mining method were considered when estimating the above factors. Where possible the recovery and dilution were calculated and elsewhere empirical estimates were made.

The mining reserves are presented in Table H-2.

TABLE H-2

HEBECOURT MINING RESERVES

SECTION	BLOCK	TONS	%REC.	TONS.REC.	%DIL.	TONS.DIL.	TOTAL TONS
11050E	1	10875	95	10330	15	1550	11880 ✓
	2	8438	95	8016	15	1202	9218 ✓
	3	8125	95	7719	15	1158	8877
	4	9625	80	7700	20	1540	9240
	5	6875	93	6394	20	1279	7673
	6	3413	95	3242	15	486	3728
	7	6000	95	5700	15	855	6555
	8	9000	95	8550	15	1283	9833
	9	12375	95	11756	15	1763	13519
	10	11000	95	10450	15	1568	12018
	11	7219	26	1877	15	282	2159
	12	3250	0	0	0	0	0
	P	8560	95	8132	20	1626	9758
SUB-TOTAL		104755		89866		14592	104458
11100E	1	22313	95	21197	15	3180	24377
	2	14063	95	13360	15	2004	15364
	3	13500	95	12825	15	1924	14749
	4	13125	95	12469	15	1870	14339
	5	9375	95	8906	20	1781	10687
	6	4200	95	3990	20	798	4788
	7	4000	95	3800	20	760	4560
	8	10125	95	9619	20	1924	11543
	9	14250	95	13538	20	2708	16246
	10	15750	95	14963	15	2244	17207
	11	14400	95	13680	15	2052	15732
	12	8750	95	8313	15	1247	9560
SUB-TOTAL		143851		136660		22492	159152
11150E	1	28438	95	27016	15	4052	31068
	2	20625	95	19594	15	2939	22533
	3	20313	95	19297	15	2895	22192
	4	18563	95	17635	15	2645	20280
	5	18563	95	17635	20	3527	21162
	6	18563	95	17635	15	2645	20280
	7	12469	95	11845	15	1777	13622
	8	32813	95	31172	15	4676	35848
	9	21094	95	20039	20	4008	24047
	10	13125	90	12469	20	2494	14963
	11	19688	95	18704	20	3741	22445
	12	11263	95	10700	20	2140	12840
	13	5300	31	1650	15	248	1898
	14	1125	0	0	0	0	0
SUB-TOTAL		241942		225391		37787	263178

TABLE H-2

11200E	1	43063	95	40910	15	6137	47047
	2	29325	90	26393	15	3959	30352
	3	21563	90	19407	15	2911	22318
	4	16156	95	15348	15	2302	17650
	5	14100	95	13395	15	2009	15404
	6	8788	90	7909	20	1582	9491
	7	5781	90	5203	20	1041	6244
	8	10125	95	9619	20	1924	11543
	9	11813	95	11222	20	2244	13466
	10	3025	62	1875	20	375	2250
SUB-TOTAL		163739		151281		24484	175765

11250E	1	2444	95	2322	15	348	2670
	2	9344	95	8877	15	1332	10209
	3	12188	95	11579	15	1737	13316
	4	9400	95	8930	15	1340	10270
	5	10800	95	10260	15	1539	11799
	6	7031	95	6679	20	1336	8015
	7	3438	90	3094	30	928	4022
SUB-TOTAL		54645		51741		8560	60301

11300E	1	10156	95	9648	15	1447	11095
	2	8481	95	8057	15	1209	9266
	3	6638	95	6306	15	946	7252
	4	3000	90	2700	20	540	3240
SUB-TOTAL		28275		26711		4142	30853

SUMMARY

SECTION	TONS. REC.	%Cu	TONS. DIL.	%Cu	TOTAL. TON	%Cu
11050E	89866	3.19	14592	.50	104458	2.75
11100E	136660	2.96	22492	.50	159152	2.61
11150E	225391	3.10	37787	.50	263178	2.73
11200E	151281	3.05	24484	.50	175765	2.70
11250E	51741	3.88	8560	.50	60301	3.40
11300E	26711	2.96	4142	.50	30853	2.63
TOTAL	681650	3.12	112057	.50	793707	2.75

5,745,190

8,307,734

14,369,518

9,491,310

4,100,468

1,622,868

43,653,884 x .90x

Rec 23,186,212 + $\frac{1.05}{.86} = 28,301,420$

Rev. = \$35.66 / ton.

15-May-90

Hebecourt - Table 1

Section	Block No.	Vertical	True Width	Tonnage Factor =		Volume	Tons
				Horizontal	Cu		
0+50 E (11,050E)	1	60	29	50	2.54	87,000	10,875 ✓
	2	50	27	50	2.54	67,500	8,438 ✓
	3	50	26	50	2.28	65,000	8,125 ✓
	4	55	28	50	2.28	77,000	9,625 X
	5	55	20	50	3.39	55,000	6,875 y
	6	42	13	50	3.39	27,300	3,413 X
	7	60	16	50	3.75	48,000	6,000 X
	8	60	24	50	3.75	72,000	9,000 3000
	9	60	33	50	3.30	99,000	12,375
	10	55	32	50	3.30	88,000	11,000
	11	55	21	50	4.70	57,750	7,219
	12	40	13	50	4.70	26,000	3,250
					3.19	769,550	96,194
1+00 E (11,100E)	1	70	51	50	2.62	178,500	22,313 ✓
	2	45	50	50	2.62	112,500	14,063 ✓
	3	45	48	50	2.78	108,000	13,500 ✓
	4	50	42	50	2.78	105,000	13,125 ✓
	5	50	30	50	4.29	75,000	9,375 ✓
	6	32	21	50	4.29	33,600	4,200 X
	7	32	20	50	3.52	32,000	4,000 X
	8	60	27	50	3.52	81,000	10,125 X
	9	60	38	50	2.74	114,000	14,250 X
	10	72	35	50	2.74	126,000	15,750 10000
	11	72	32	50	2.88	115,200	14,400
	12	50	28	50	2.88	70,000	8,750
					2.96	1,150,800	143,850
1+50 E (11,150E)	1	70	65	50	3.09	227,500	28,438 ✓
	2	50	66	50	3.09	165,000	20,625 ✓
	3	50	65	50	2.52	162,500	20,313 ✓
	4	45	66	50	2.52	148,500	18,563 ✓
	5	45	66	50	3.11	148,500	18,563 ✓
	6	45	66	50	3.11	148,500	18,563 X
	7	35	57	50	3.38	99,750	12,469 y
	8	70	75	50	3.38	262,500	32,813 y
	9	75	45	50	3.00	168,750	21,094 y
	10	50	42	50	3.00	105,000	13,125 ✓
	11	70	45	50	2.86	157,500	19,688 X
	12	53	34	50	2.86	90,100	11,263 X
	13	53	16	50	6.34	42,400	5,300
	14	30	6	50	6.34	9,000	1,125
					3.10	1,935,500	241,938
2+00 E (11,200E)	1	65	106	50	2.60	344,500	43,063 ✓
	2	46	102	50	2.60	234,600	29,325 ✓
	3	46	75	50	2.96	172,500	21,563 ✓
	4	47	55	50	2.96	129,250	16,156 ✓
	5	47	48	50	3.76	112,800	14,100 ✓
	6	37	38	50	3.76	70,300	8,788 5000
	7	37	25	50	3.27	46,250	5,781 X
	8	90	18	50	3.27	81,000	10,125 X
	9	90	21	50	4.18	94,500	11,813 y
	10	22	22	50	4.18	24,200	3,025 y
					3.05	1,309,900	163,738

VI - 4 Exploration Potential

The exploration potential of the subject property, as well as the "West Block" property now a part of the Noranda-Deak Joint Venture, is covered in the Curtis's Report (1988). The mafic-felsic volcanic contact, host to both the Hebecourt and other Noranda-type base metal deposits, has been tested for a limited strike length and to only a vertical depth of some 1600 ft. on the subject property.

Numerous earlier authors have concluded that the Hebecourt (proximal) and adjoining to the west Iso-Magusi (distal) deposits were formed during the same volcanic event. (Iso Mines, 1974; Teck Corp., 1974; Myers, 1979). Very limited exploration has been conducted on the intervening 4000 ft. between the two deposits.

Similarly, the contact east and west of the two known deposits has been tested only to the effective depth of electromagnetic geophysics.

The gold potential of the properties is virtually untested.

In summary, the exploration potential of the property and surrounding area is excellent.

VI - 5 Environmental

During the initial phases of the Deak Resources Corp. base metal strategy, the Hebecourt property was scheduled to be the first one in operation. Consequently, an environmental study was commissioned and carried out by Roche & Associates of Quebec in May 1989. The study was aimed at dewatering of the open pit to take a metallurgical bulk sample of 30-50,000 tons. Approval to proceed with this program was received shortly after from the Ministry of the Environment.

While the mining is scheduled to be done from underground and subsequently dropping the crown pillar, it is possible that one bench could be taken from the pit during the early stages of the program. This would require more examination if desired, to assess pit walls and overall pit design.

The water treatment for the Hebecourt will be more substantial than Magusi because of the pyrrhotite content and the larger drainage basin. The expected volumes and treatment rate is discussed in the Magusi report.

The Hebecourt property will share the water treatment infrastructure with Magusi and likewise assume its share of the capital costs. Water treatment cost's for Hebecourt are forecasted as follows:

<u>YEAR</u>	<u>Magusi</u>		<u>Hebecourt</u>	
	<u>MONTHS</u>	<u>COSTS</u>	<u>MONTHS</u>	<u>COSTS</u>
1	-	-	-	-
2	4	26	-	-
3	8	52	-	-
4	8	52	-	-
5	6	39	4	55
6	2	13	6	82
7	-	-	8	109
8	-	-	8	<u>109</u>
	<u>TOTAL</u>		182	355

The capital cost for the water treatment plant is estimated at \$624,000 plus \$100,000 for the required basins. The capital and operating cost can only be considered as "order of magnitude" at this time. Only testing to establish acid generation potential, possible additional controls and alternatives will permit more precise evaluation of the costs.

The surface plan M-3 indicates the proposed site arrangement with pumping from both the Magusi and Hebecourt site to the centrally located mine site-treatment facilities.

VI - 5.1 Water Supply

Both the process and potable water will be available from Lac Duparquet. A pumphouse will be set up at the former pumphouse location.

VI - 5.2 Power Supply

The power requirements for Hebecourt will be essentially the same as those estimated for Magusi. Even with the two properties operating simultaneously for a period of about one year, the 1500 KW. installed power will be sufficient to meet demand, as all Magusi development will have been completed, with only some production drilling remaining to be completed.

Power for the underground will be as indicated on the surface plan. A 4160 V line will come from the main substation to a transformer located near the ventilation-escape raise. The power line will be taken underground via the ventilation-escape raise at a tension of 575 V and the power delivered to the level distribution panels.

VI - 5.3 Communications

A telephone communication line will be taken underground via the ventilation raise and distributed from there. This will ensure that communication underground can be carried out from a fresh air base at all times.

VI - 5.4 Fire Protection

Standard stench warning systems will be installed in both the compressed air and mine ventilation air circuits for early warning in case of an underground fire. Standard type-n masks will be maintained on site

VI - 6 Mining

VI - 6.1 U/G Access

As mentioned previously and indicated on the Hebecourt surface plan, the top of the orebody was stripped and a first bench was mined by open pit. The underground was accessed via an 12 ft. by 15 ft. ramp down to the 400 level elevation. The ventilation raise was also completed from the 350 level to surface and sublevel development on ore was carried out on the 150, 200 and 250 levels. Access to the 300, 350 and 400 levels are completed as indicated on the level plans. See Volume II-Plans & Sections.

VI - 6.2 Development

Since the ore bottoms at approximately the 600 level the ramp will be driven for about 200 vertical feet (1300 ft.in length) and the ore accessed at the regular 50 foot vertical intervals. The lower sublevels will be developed as production is supplied from the upper sublevels, once a minimum amount of preparatory development on the upper levels is completed.

The ventilation-escapeway raise will be extended from the lower levels to connect with the existing system. Development dimensions are the same as that of the Magusi property since the equipment sizes will be standard. Development quantities for the Hebecourt property are listed in Table H-3.

TABLE H-3

HEBECOURT PROPERTY
DEVELOPMENT REQ.S

LEVEL	RAMP 12'x16'	ACC.DR. 10'x13'	ORE.DR. 10'x13'	DR.PTS. 10'x13'	ACC.DR. 8'x8'	SLASH TONS	SLOT.RSE. 6'x6'	VENT.RSE. 6'x8'
150	-	-	395	-	-	1781	80	-
200	-	-	-	-	-	780	45	-
250	-	35	20	-	-	1906	45	-
300	-	140	310	-	-	625	45	-
350	-	35	190	-	-	1875	45	-
400	-	245	430	-	-	475	45	-
450	235	105	365	-	55	450	45	55
500	535	395	130	90	25	-	45	120
550	400	85	100	-	-	1688	45	-
600	240	175	100	-	30	-	45	115
SUMP	110							
TOTALS	1520	1215	2040	90	110	9581	485	290

VI - 6.3 Stopping Methods

The Hebecourt deposit was developed for the sublevel longhole retreat mining method and this method will be maintained on the lower levels. Access is achieved to each sublevel via the ramp and then the sublevels are developed laterally from east to west.

A slot raise is driven between sublevels at the west end and longhole drilling (2.5" dia.) starts at the west end advancing eastward. Blasting is carried out in retreat from west to east with the sublevel above slightly ahead of the one below.

This method offers flexibility in that mucking can be carried out from several sublevels at the same time. Also while drawpoints are driven on the lowest levels for final recovery, they are not required on each sublevel thereby reducing the required amount of development.

The crown pillar (top 60 feet) will be drilled off from surface using the I.T.H. drilling at 6.5" dia., loaded and blasted from surface at the end of the mine life.

VI - 6.4 Production Rate

The production rate of 750 T.P.D. for a monthly tonnage of 22,500 tons will require 3 operating sublevels. The present mining schedule is based on a normal 5 day per week operation at 1070 T.P.D. to supply the mill requirement.

The mine life at this production rate is 3 years with the listed mining reserves. Increased production is possible through a 30 day operating schedule which would reduce the mine life to 2 years. While the Magusi orebody can rely on large blasthole stoping, Hebecourt must rely only on the sublevel retreat mining and pushing production requirements beyond 22,500 T.P.M. would be difficult to maintain. The production requirement can be estimated as follows:

ORE WIDTH = 38 FT. SUBLV. INT. = 50 FT. EFF.DRILL = 45 FT.

TONS/FT. = 40' x 38' / 8 = 175

TONS/RING = 175 T.P.F. x 4 FT. = 700

MUCK RECOVERED PER RING = 50%

RINGS REQUIRED PER DAY = 1070 T.P.D. / 700 x .50 = 3.05

The cycling of 3 sublevels for blasting 3 rings per day should not present any problems. Note that muck recovery per ring may be increased by utilising remote control mucking. Any muck that stays in the back end of the stope will be recovered from the drawpoints on the lower levels. Hebecourt will sustain a production of 22,500 T.P.M. primarily because of the good width as the production of the first two years will come from sublevel retreat only.

VI 6.5 Dilution

From section 3.2, the reserves indicate a recovery of 93.5% and a dilution of 16.5% on average.

This dilution lowered the overall grade from ^{3.12} 2.78 to 2.75% Cu.

2.46%

Attention to drilling and blasting design and control will be important in an effort to keep dilution as low as possible.

VI 6.6 Ground Control

Ground control at Hebecourt will include the basic rock bolting, screening and strapping carried out during development.

While no allowance has been made for cablebolting in the capital cost, the crown pillar will be monitored with extensometers installed from the old pit floor.

VI - 6.7 Mine Services

VI - 6.7.1 Ventilation & Heating

The Hebecourt ventilation and mine air heating systems will essentially be the same as that for Magusi as the distances utilised for resistance calculations, heading sizes and diesel equipment used are the same. The rated capacities may be restated as follows:

Ventilation 80-90,000 C.F.M. @ 8.0 S.P.

Heating 7 M.M.B.T.U./HR.

Fresh air will downcast in the vent raise and forced in to the various sublevels. The exhaust air will upcast the ramp to surface. The capital costs for ventilation and heating are detailed in Appendix I.

VI - 6.7.2 Power

As shown on the surface plan, an extension line from the main substation to Hebecourt will be required. This line will be 4160 V to reduce cable size requirements and the voltage will be reduced by a transformer at the site. From the transformer station, 575 V power will be delivered underground via the ventilation-escapeway raise.

VI - 6.7.3 Compressed Air

The compressed air requirements for Hebecourt will be as follows:

EQUIPMENT	C.F.M.REQD.
Jumbo Drill	1,000
L.H. Drill (2)	710
Airlegs (4)	520
Misc.	<u>223</u>
TOTAL	2,453

VI - 7 Metallurgy

Metallurgical information for the Hebecourt ore was obtained from Noranda and Orocon Inc. and has been reviewed by K.D. Hester, P. Eng. in a companion Report. A copper recovery of 92% has been projected.

VI - 8 Plant

Because of their proximity, the Hebecourt and Magusi properties will share a common surface plant with some obvious advantages. A surface plan showing the arrangement is included in Volume II-Plans & Sections.

Since the milling will take place on a batch basis for the base metal properties, some area will be needed for stockpiling on site. Because both of the properties will produce ore and waste that are acid generators, these areas will be kept as small as possible and covered if practicle to do so. The stockpile area will be properly ditched for collection of all drainage through the stockpile material.

Sludge production from the Hebecourt water treatment will be pumped to the Magusi underground for storage.

Items that will require servicing in the surface plant will include, the water treatment plant, buildings, compressors and pumps.

VI - 9 Cost Estimates

VI - 9.1 Capital Costs

The capital costs estimated for the Hebecourt property may be summarized as follows:

<u>DESCRIPTION</u>	<u>COSTS</u>
Site Prep.,Roads	\$156,000
Surface Plant	472,000
Surface Equip.	215,000
U/G Installations	446,000
U/G Equipment	<u>935,000</u>
TOTAL	\$2,224,000

The details of these capital costs are given in Appendix I. Of particular importance is the surface and u/g equipment which has been evaluated as purchase of equipment either from the MacDonald or Magusi projects. In this regard, Hebecourt will pay the salvage value to either of these projects. This is believed to be realistic if the alternative of purchasing good used equipment is considered.

VI - 9.2 Pre-Production Development

The pre-production period at Hebecourt will be short with production underway within 6 months once environmental approval is obtained. The pre-production costs are as listed below and are based on preparing the upper 4 levels.

<u>DESCRIPTION</u>	<u>COSTS</u>
Acc. Dr. 175 Ft.@ \$250.53	\$ 43,843
Ore Dr. 725 Ft.@ \$265.91	192,785
Slash Ore 5100T @ \$10.64	54,264
Slot Rse. 215 Ft.@ \$165.62	35,608
L.H. Dr. 25000Ft.@ \$3.40	85,000
L.H.BI. 10000T @ \$2.18	21,800
Tram O/W 30000T @ \$4.04	121,200
G.M.E. (6Mo.)	568,500
Plant (6Mo.)	286,000
Admin. (6Mo.)	<u>248,000</u>
TOTAL = \$1,657,000	

VI - 9.3 Operating Costs

The Hebecourt operating costs are given below with the details provided in Appendix II and III.

ITEM	DESCRIPTION	COST/TON	TOTAL/TON
1. Mining	Current Dev.	\$ 1.17	
	Stope Dev.	0.56	
	Stope Mining	5.24	
	Tramming	4.17	
	Gen. Mine Exp.	<u>5.57</u>	
	TOTAL	\$ 16.71	\$16.71

2. Milling	- Area milling V. Town	\$15.00	
3. Plant	Labour	\$ 0.78	
	Material	0.63	
	Power	<u>1.39</u>	
	TOTAL	\$ 2.80	\$ 2.80

ITEM	DESCRIPTION	COST/TON	TOTAL/TON
4. Admin.	Labour	\$ 0.81	
	Material	0.51	
	Admin. O/Site	<u>1.88</u>	
	TOTAL	\$ 3.20	\$ 3.20
5. Trucking	Contract Basis	<u>\$ 6.50</u>	
	TOTAL =		\$ 44.21

APPENDIX I

CAPITAL COST DETAILS

HEBECOURT

CAPITAL COST - SUMMARY

1.) SITE PREP., ROADS, DAMS

-SEDIMENTATION BASIN	= \$ 50,000
-SECURE PORTAL	= 4,000
-SITE PREP. PIT CLEAN UP	= 40,000
-SITE FENCING	= 40,000
-RAW WATER	= <u>22,000</u>

TOTAL = \$156,000

2.) SURFACE PLANT

-WATER TREATMENT PLANT	= \$312,000
-HYDRO LINE EXTENSION	= 42,000
-COMPRESSOR ROOM-MOVE & INST.	= 50,000
-MINE VENT. FAN	= 35,000
-MINE AIR HEATER	= <u>33,000</u>

TOTAL = \$472,000

3.) SURFACE MOBILE/STAT. EQUIP.

-SALVAGE ON MAGUSI	= \$140,000
-PLUS ONE NEW COMPRESSOR	= <u>75,000</u>

TOTAL = \$215,000

4.) U/G INSTALLATIONS

-U/G POWER DISTRIBUTION	= \$300,000
-VENT. DOORS & BKH.	= 50,000
-AUX. VENT. FANS	= 16,000
-PUMPS & SUMPS	= <u>80,000</u>

TOTAL = \$446,000

5.) U/G EQUIPMENT

-FROM MACDONALD OR MAGUSI OR PURCHASE OF GOOD USED EQUIP.	= \$935,000
--	-------------

GRAND TOTAL = \$2,224,000

HEBECOURT

CAPITAL COSTS - DETAILS

1.) SITE PREP., ROADS, DAMS

A.) SEDIMENTATION BASIN-SHARE		= \$ 50,000 /
B.) SECURE PORTAL- KNOCK OUT WALL & REHAB. 10 M.S. @ \$25/HR. = \$2000 MATERIAL 50% = \$2000		= \$ 4,000
C.) PIT CLEAN UP SCALE, MUCK, WASH DOWN 4 MEN x 20 SH. @ \$25/HR. = \$16,000 1 TRUCK \$75/HR = 12,000 1 SCOOP \$75/HR = 12,000		= \$ 40,000
D.) SITE FENCING PIT PERIMETER 1600 FT. @ \$25/FT.		= \$ 40,000
E.) RAW WATER SUPPLY PUMPHOUSE 10' x 12' @ \$25/SQ.FT. = \$3,000 PUMP & ELECTRICS = 7,000 PIPING 500' @ \$15/FT. INST. = 7,000 MISC. (25%) = 4,375 TOTAL = 21,875		= \$ 22,000

2.) SURFACE PLANT

A.) WATER TREATMENT PLANT 50% SHARE		= \$312,000 /
B.) HYDRO LINE EXTENSION ^{FROM M. 451} 4500 FT. = 1.4 KM. @ \$30,000/KM.		= \$ 42,000
C.) COMPRESSOR ROOM BLDG. 30' x 50' @ \$15/SQ.FT. = \$22,500 COMP. INST. 3 @ \$10,000 = 30,000 TOTAL = \$52,500		= \$ 53,000
D.) VENT. FAN 150 H.P. 100,000 C.F.M. @ 8" S.P.		= \$ 35,000
E.) MINE AIR HEATER 7M. B.T.U./HR.		= \$ 33,000

3.) SURFACE MOBILE/STAT. EQUIP.

-MAGUSI VALUE \$400,000 x 35% SALVAGE.		= \$140,000
-PLUS ONE NEW COMPRESSOR		= \$ 75,000

4.) U/G INSTALLATIONS

-U/G POWER DIST.		
-10 LV. @ \$30,000		= \$300,000
-VENT.DOOR. & BKH.		
-10 LV. @ \$ 5,000		= \$ 50,000
-AUX. FANS		
-2 UNITS @ \$8,000		= \$ 16,000
-PUMPS & SUMPS		
-2 UNITS M.& P.@ \$30,000		= \$ 60,000
-SUMPS PREP.		
-CONC.WALL & MAT'L		= \$ 20,000

5.) U/G EQUIPMENT

-BUY OUT MAGUSI EQUIPMENT AT A SALVAGE
 VALUE OF \$861,000 OR PURCHASE USED EQUIP.
 AS FOLLOWS:

<u>DESCRIPTION</u>	<u>NO.</u>	<u>PRICE USED</u>	<u>TOTAL COST</u>
30T TRUCK	3	\$ 125,000	\$ 375,000
5YD.SCOOP	3	\$ 135,000	405,000
1YD.SCOOP	1	\$ 55,000	55,000
SER.VEH.	2	\$ 10,000	20,000
L.H.DRILL	2	\$ 40,000	<u>80,000</u>
		TOTAL	= \$935,000

APPENDIX II

OPERATING COST DETAILS

HEBECOURT

OPERATING COST DETAILS

(784,000TONS)

1.) MINING	<u>COSTS</u>	<u>COST/TON</u>
A.) CURRENT DEV.		
RAMP 1520FT. @\$311.58	473,600	
ACC.DR. 1040FT. @\$250.53	260,550	
DR.PTS 90FT. @\$250.53	22,548	
VENT.RSE 270FT. @\$490.16	132,343	
ACC.DR. 110FT. @\$220.01	<u>24,200</u>	
TOTAL	\$913,241	-----\$ 1.17
B.) STOPE DEV.		
ORE DR. 1315FT. @\$265.91	349,672	
SLOT RSE. 270FT. @\$165.62	44,717	
SLASH ORE 4500 T. @\$10.64	<u>47,880</u>	
TOTAL	\$442,269	-----\$ 0.56
C.) STOPPING		
L.H.DR. 322,200FT. @\$3.4	1,095,480	
L.H.BL. 615,060 T. @\$2.18	1,340,830	
L.H.MUCK. 625,060 T. @\$1.73	1,081,354	
I.T.H.DR. 28,150FT. @\$4.73	133,150	
I.T.H.BL. 152,000 T. @\$1.30	197,600	
I.T.H.MU. 152,000 T. @\$1.73	<u>262,960</u>	
TOTAL	\$4,111,374	-----\$ 5.24
D.) TRAMMING		
TRAM 803,000 T. @\$4.04	3,244,120	
STK.REC. 17,850 T. @\$1.50	<u>26,775</u>	
TOTAL	\$3,270,895	-----\$ 4.17
E.) G.M.E.		
ENG,GEO, LABOUR(5)	710,500	
SUPER. LABOUR(3)	517,500	
ELE,MEC, TRADES(8)	1,164,000	
U/G LABOUR (3)	416,000	
U/G SUPPLIES	<u>1,555,000</u>	
TOTAL	\$4,363,000	-----\$ 5.57
TOTAL MINING	\$13,100,779	-----\$16.71

	<u>COSTS</u>	<u>COST/TON</u>
2.) MILLING	\$11,910,000----	\$15.00
3.) PLANT(764,000T)		
LABOUR	614,500	
POWER	1,087,000	
MATERIALS	<u>491,000</u>	
	TOTAL \$ 2,192,500-----	\$ 2.80
4.) ADMINISTRATION		
MANAG., ACCT., LABOUR(4)	638,000	
MATERIAL	398,000	
ADMIN. O/SITE	<u>1,475,000</u>	
	TOTAL \$ 2,511,000-----	\$ 3.20
5.) TRUCKING		
CONTRACT BASIS T.N.O.	\$ 5,161,000-----	<u>\$ 6.50</u>
	TOTAL OPERATING COST/TON-----	\$44.21

APPENDIX III
HEBECOURT PROPERTY
SCHEDULE OF OPERATING COSTS

HEBE90

PROJECT: HEBECOURT

SUMMARY OF INVESTMENT, OPERATING COSTS & PRODUCTION

(,000 \$)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PRODUCTION									
- TONS MILLED					113,000	272,000	272,000	137,000	794,000
PRODUCTION (IN CONCENTRATE)									
- COPPER (LBS X 1000)					5,718	13,763	13,763	6,932	40,176
- ZINC (LBS X 1000)					0	0	0	0	0
- GOLD (OUNCES X 1000)									0
- SILVER (OUNCES X 1000)									0
OPERATING COSTS									
- MINING					3,134	5,203	4,268	1,992	14,597
- MILLING					1,695	4,080	4,080	2,055	11,910
- PLANT					570	760	760	380	2,469
- ADMINISTRATION					496	904	904	454	2,758
- TRUCKING					735	1,768	1,768	891	5,161
TOTAL OPERATING COSTS					6,629	12,715	11,780	5,771	36,895
CAPITAL & PREPROO.DEV.									
- CAPITAL (EXPANSION)					2,224				2,224
- ONGOING CAPITAL									0
- DEFERRED DEVELOPMENT									0
TOTAL CAPITAL & PPD					2,224	0	0	0	2,224
OPERATING COSTS PER TON									
- MINING					27.73	19.13	15.69	14.54	18.38
- MILLING					15.00	15.00	15.00	15.00	15.00
- PLANT					5.04	2.79	2.79	2.77	3.11
- ADMINISTRATION					966.71	3.32	3.32	3.31	3.47
- TRUCKING					6.50	6.50	6.50	6.50	6.50
TOTAL COSTS PER TON					1020.98	46.74	43.31	42.13	46.47

SCHEDULE OF UNDERGROUND WORK COSTS

DESCRIPTION OF WORK	RATE PER UNIT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
	0	0	0	0	0	0	0	0	0	0
1.RAMP (12x16)	311.58	0	0	0	0	474	0	0	0	474
	0	0	0	0	0	0	0	0	0	0
2.ACC.DR. (10x13)	250.53	0	0	0	0	44	261	0	0	304
	0	0	0	0	0	0	0	0	0	0
3.DR. POINTS (10x13)	250.53	0	0	0	0	0	23	0	0	23
	0	0	0	0	0	0	0	0	0	0
4.VENT.RSE.&ESC.WAY(6x8)	490.16	0	0	0	0	0	132	0	0	132
	0	0	0	0	0	0	0	0	0	0
5.ACC.DR. (8x8)	220.01	0	0	0	0	0	24	0	0	24
	0	0	0	0	0	0	0	0	0	0
6.ORE DR. (10x13)	265.91	0	0	0	0	193	350	0	0	542
	0	0	0	0	0	0	0	0	0	0
7.SLOT RSE. (6x6)	165.62	0	0	0	0	36	45	0	0	80
	0	0	0	0	0	0	0	0	0	0
8.SLASH ORE	10.64	0	0	0	0	54	48	0	0	102
	0	0	0	0	0	0	0	0	0	0
9.L.H. DRILLING (2.5")	3.40	0	0	0	0	182	513	486	0	1,180
	0	0	0	0	0	0	0	0	0	0
10.L.H. BLASTING	2.18	0	0	0	0	209	593	560	0	1,363
	0	0	0	0	0	0	0	0	0	0
11.L.H. MUCKING	1.73	0	0	0	0	166	471	445	0	1,081
	0	0	0	0	0	0	0	0	0	0
12.I.T.H. DRILLING (6.5")	4.73	0	0	0	0	0	0	13	120	133
	0	0	0	0	0	0	0	0	0	0
13.I.T.H. BLASTING	1.30	0	0	0	0	0	0	20	178	198
	0	0	0	0	0	0	0	0	0	0
14.I.T.H. MUCKING	1.73	0	0	0	0	0	0	26	237	263
	0	0	0	0	0	0	0	0	0	0
15.TRAM WASTE	4.04	0	0	0	0	105	52	0	0	158
	0	0	0	0	0	0	0	0	0	0
16.TRAM ORE	4.04	0	0	0	0	457	1,099	1,099	553	3,208
	0	0	0	0	0	0	0	0	0	0
17.STKPILE REC.	1.50	0	0	0	0	27	0	0	0	27
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
EQUIPMENT RENTALS	6500	0	0	0	0	0	0	0	39	39
	0	0	0	0	0	0	0	0	0	0
WATER TREATMENT	13650	0	0	0	0	55	82	109	109	355
	0	0	0	0	0	0	0	0	0	0
TOTALS		0	0	0	0	2,000	3,692	2,757	1,237	9,686

SCHEDULE OF SUPERVISION AND LABOUR OVERHEADS

DESCRIPTION OF WORK		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
-MINE ENGINEER	HOURS					1,560	2,080	2,080	1,040	6,760
-PROJECT ENGINEER	HOURS									0
-MINE GEOLOGIST	HOURS					1,560	2,080	2,080	1,040	6,760
-ASSIST. GEOLOGIST	HOURS									0
-TECHNICIAN 1	HOURS					1,560	2,080	2,080	1,040	6,760
-TECHNICIAN 2	HOURS					1,560	2,080	2,080	1,040	6,760
-TECHNICIAN 3	HOURS					1,560	2,080	2,080	1,040	6,760
-TECHNICIAN 4	HOURS									0
-MINE SHIFTBOSS	HOURS					4,680	6,240	6,240	3,120	20,280
-MINE TRAINER	HOURS									0
-MECHANIC	HOURS					9,360	12,480	12,480	6,240	40,560
-ELECTRICIAN	HOURS					3,120	4,160	4,160	2,080	13,520
-OTHER TRADES	HOURS									0
-MINER 1	HOURS					3,120	4,160	4,160	2,080	13,520
-MINER 2	HOURS					1,560	2,080	2,080	1,040	6,760
										0
										0
										0
										0
										0
MONTHLY MATERIAL COSTS										0
-GEO.&ENG. SUPPLIES	MONTHS					9	12	12	6	39
-MINE RES.&TRAIN.	MONTHS					9	12	12	6	39
-	MONTHS					9	12	12	6	39
-MINE DRY	MONTHS					9	12	12	6	39
-MINE DEWATERING	MONTHS					9	12	12	6	39
-VENTILATION	MONTHS					9	12	12	6	39
-SIGNALS, TELEPHONE	MONTHS					9	12	12	6	39
-SERVICE VEH.	MONTHS					9	12	12	6	39
-MINERS LAMPS	MONTHS					9	12	12	6	39
-SMALL TOOLS	MONTHS					9	12	12	6	39
-LEVEL MTCE.	MONTHS					9	12	12	6	39
-BULKHEADS, CONST.	MONTHS					9	12	12	6	39
-SCOOPTRAM 2 YD.	MONTHS					9	12	12	6	39
-MINE AIR HEATING	MONTHS					9	12	12	6	39
-DEF. D.D.	MONTHS					9	12	12	6	39
-PIPE LINES	MONTHS					9	12	12	6	39
-WASTE DISPOSAL	MONTHS					9	12	12	6	39
-ORE HANDLING	MONTHS					9	12	12	6	39
-GROUTING	MONTHS					9	12	12	6	39
-UG.SHOP SUPPLIES	MONTHS					9	12	12	6	39
-OTHER	MONTHS					9	12	12	6	39
-CONSULTANTS	MONTHS					9	12	12	6	39

SCHEDULE OF SUPERVISION AND LABOUR EXPENDITURES

DESCRIPTION OF WORK	COST PER HOUR	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
-MINE ENGINEER	31.24	0	0	0	0	49	65	65	32	211
-PROJECT ENGINEER	26.47	0	0	0	0	0	0	0	0	0
-MINE GEOLOGIST	30.05	0	0	0	0	47	63	63	31	203
-ASSIST. GEOLOGIST	26.47	0	0	0	0	0	0	0	0	0
-TECHNICIAN 1	17.40	0	0	0	0	27	36	36	18	118
-TECHNICIAN 2	18.73	0	0	0	0	29	39	39	19	127
-TECHNICIAN 3	21.38	0	0	0	0	33	44	44	22	144
-TECHNICIAN 4	26.47	0	0	0	0	0	0	0	0	0
-MINE SHIFTBOSS	28.86	0	0	0	0	135	180	180	90	585
-MINE TRAINER	28.86	0	0	0	0	0	0	0	0	0
-MECHANIC	24.03	0	0	0	0	225	300	300	150	974
-ELECTRICIAN	25.27	0	0	0	0	79	105	105	53	342
-OTHER TRADES	24.03	0	0	0	0	0	0	0	0	0
-MINER 1	21.38	0	0	0	0	67	89	89	44	289
-MINER 2	24.03	0	0	0	0	37	50	50	25	162
0	27.66	0	0	0	0	0	0	0	0	0
0	25.27	0	0	0	0	0	0	0	0	0
0		0	0	0	0	0	0	0	0	0
0		0	0	0	0	0	0	0	0	0
MONTHLY MATERIAL COSTS		0	0	0	0	0	0	0	0	0
-GEO.&ENG. SUPPLIES	1,200	0	0	0	0	11	14	14	7	47
-MINE RES.&TRAIN.	1,000	0	0	0	0	9	12	12	6	39
-	0	0	0	0	0	0	0	0	0	0
-MINE DRY	500	0	0	0	0	5	6	6	3	20
-MINE DEWATERING	500	0	0	0	0	5	6	6	3	20
-VENTILATION	1,000	0	0	0	0	9	12	12	6	39
-SIGNALS, TELEPHONE	300	0	0	0	0	3	4	4	2	12
-SERVICE VEH.	5,000	0	0	0	0	45	60	60	30	195
-MINERS LAMPS	500	0	0	0	0	5	6	6	3	20
-SMALL TOOLS	1,000	0	0	0	0	9	12	12	6	39
-LEVEL MICE.	1,500	0	0	0	0	14	18	18	9	59
-BULKHEADS,CONST.	1,000	0	0	0	0	9	12	12	6	39
-SCOOPTRAM 2 YD.	7,000	0	0	0	0	63	84	84	42	273
-MINE AIR HEATING	11,000	0	0	0	0	99	132	132	66	429
-DEF. D.D.	5,000	0	0	0	0	45	60	60	30	195
-PIPE LINES	500	0	0	0	0	5	6	6	3	20
-WASTE DISPOSAL	1,500	0	0	0	0	14	18	18	9	59
-ORE HANDLING	500	0	0	0	0	5	6	6	3	20
-GROUTING	2,500	0	0	0	0	23	30	30	15	98
-UG.SHOP SUPPLIES	1,000	0	0	0	0	9	12	12	6	39
-OTHER	1,500	0	0	0	0	14	18	18	9	59
-CONSULTANTS	1,000	0	0	0	0	9	12	12	6	39
TOTALS		0	0	0	0	1,133	1,511	1,511	756	4,911

SCHEDULE OF PLANT & ADMINISTRATIVE EXPENDITURES

DESCRIPTION OF WORK	UNITS OR AMOUNT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	TOTALS
PLANT LABOUR COSTS		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-TRADESMAN 1	21.38	0	0	0	0	33	44	44	22	144
-TRADESMEN 2	21.38	0	0	0	0	33	44	44	22	144
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-EQUIP. OPERATOR	21.38	0	0	0	0	33	44	44	22	144
-LABOURER	18.73	0	0	0	0	58	78	78	39	253
PLANT MATERIAL COSTS		0	0	0	0	0	0	0	0	0
-HYDRO.POWER DIST.	0.05	0	0	0	0	284	378	378	189	1,229
-COMPRESSORS	1000	0	0	0	0	9	12	12	6	39
-SHOP SUPPLIES	1500	0	0	0	0	14	18	18	9	59
-WATER, SEWAGE	500	0	0	0	0	5	6	6	3	20
-YARDS, ROADS	2000	0	0	0	0	18	24	24	12	78
-SECURITY	5000	0	0	0	0	45	60	60	30	195
-BLDG. MAINT., HEAT	1500	0	0	0	0	14	18	18	9	59
-		0	0	0	0	0	0	0	0	0
-SERV. VEHICLES	1200	0	0	0	0	11	14	14	7	47
-LOADER, TRUCK MTCE.	1500	0	0	0	0	14	18	18	9	59
TOTAL PLANT COSTS		0	0	0	0	570	760	760	380	2,469
ADMINISTRATIVE		0	0	0	0	0	0	0	0	0
-ADMIN. 1	16.08	0	0	0	0	25	33	33	17	109
-		0	0	0	0	0	0	0	0	0
-		0	0	0	0	0	0	0	0	0
-MANAGEMENT	12000	0	0	0	0	108	144	144	72	468
-WAREHOUSE	21.38	0	0	0	0	33	44	44	22	144
-PURCHASING	21.38	0	0	0	0	0	0	0	0	0
-TELEPHONE, TELEX	2500	0	0	0	0	23	30	30	15	98
-TRAVEL, ACCOM.	1500	0	0	0	0	14	18	18	9	59
-INSURANCE	1500	0	0	0	0	14	18	18	9	59
-TRAINING, SAFETY	1500	0	0	0	0	14	18	18	9	59
-RECRUITMENT	1000	0	0	0	0	9	12	12	6	39
-OFFICE SUPP. LEASES	1500	0	0	0	0	14	18	18	9	59
-EMPLOYEE MED. SAFETY	1000	0	0	0	0	9	12	12	6	39
-ALLOCATED COSTS	0	0	0	0	0	0	0	0	0	0
-TAXES (MUN.)	1000	0	0	0	0	9	12	12	6	39
-OFFSITE ADMIN.	2.00	0	0	0	0	226	544	544	274	1,588
TOTAL ADMINISTRATIVE COSTS		0	0	0	0	496	904	904	454	2,758

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