



# Bergvesenet

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## Rapportarkivet

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Tittel A/S BLEKVASSLI GRUBER, PRELIMINARY ECONOMIC EVALUATION				
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Råstofgruppe Malm/metall		Råstofftype Pb, Zn		
Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse Evalueringen er utarbeidet i forbindelse med en eventuell overtakelse av Bleikvassli Gruber. Rapporten gir en oversikt over geologi og malmreserver, gruvedrift, oppredning, infrastruktur og økonomiske estimater. Den konkluderer imidlertid med:  "The inncreased capacity is calculated by two main variations. None of them gives a positive result when the budget prices are used. A test was made by decreased investments, but the economic calculation gave still negative results. Only a better Zn price would give a positive result (App. 17, 18, 19). At the budget price the Zn-revenues of 1991 to 1993 decrease by NOK 17 million, i.e. the same as the desired amount for investment!. The risk is unacceptable, specially when we do not know the environmental obligations after some years."				



*häre för  
invores bruk*

*flera*

**A / S BLEIKVASSLI GRUBER**

**PRELIMINARY ECONOMIC EVALUATION**

**ordered by Norsulfid A/S**

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## CONTENTS

## Page

1	GENERAL	4
2	SUMMARY AND RECOMMENDATIONS	4
3	GEOLOGY AND ORE RESERVES	4
	3.1 Explorations	4
	3.2 Ore formations	5
	3.3 Ore reserves	6
	3.4 Drilling plan	7
4	MINING	8
	4.1 Mineable reserves	8
	4.2 Ore production	9
	4.3 Stoping, hauling	10
	4.4 Machines	10
	4.5 Investments, costs	11
	4.6 Personnel	12
5	CONCENTRATOR	12
	5.1 Production	12
	5.2 Concentrating	13
	5.2.1 Crushing	
	5.2.2 Grinding	
	5.2.3 Flotation	
	5.2.4 Dewatering	
	5.2.5 Assaying	
	5.2.6 Tailings disposal and water	
	5.3 Infrastructure of the concentrator	16

6	INFRASTRUCTURE	16
6.1	Landowners, royalties, claims	16
6.2	Electric power	17
6.3	Roads, telecommunications	17
6.4	Buildings	17
6.5	Personnel	17
6.6	Investments for infrastructure	17
7	ECONOMIC ESTIMATES	18
7.1	Revenues	18
7.2	Capital costs	18
7.3	Operating costs	19
7.4	Sensitivity analyses	19
8	APPENDICES	20

## 1 GENERAL

This study was made by Outokumpu Mining Services to Norsulfid A/S as a completion for the study made last autumn (266/89), especially concerning ore estimates.

A/S Bleikvassli Gruber is owned by Sydvaranger A/S (through its subsidiary Malm og Mineralindustri A/S). It is some 70 km to the south of Mo i Rana, 25 km from E6 (App. 1).

The mine started in 1957 and has leased the claims until the year 2002.

The underground mine produces mainly Zn and Pb concentrates, only minor amounts of Cu concentrates.

Production in 1989:

	ton (1 000)	Zn %	Pb %	Cu %
Ore	176.0	4.6	2.5	0.13
Zn conc.	13.0	53.0	2.0	0.6
Pb conc.	6.0	8.6	59.0	1.0
Cu conc.	0.2	3.5	18.0	18.0

## 2 SUMMARY AND RECOMMENDATIONS

The increased capacity is calculated by two main variations. None of them gives a positive result when the budget prices are used. A test was made by decreased investments, but the economic calculation gave still negative results. Only a better Zn price would give a positive result (App. 17, 18, 19). At the budget price the Zn-revenues of 1991 to 1993 decrease by NOK 17 million, i.e. the same as the desired amount for investments !

The risk is unacceptable, specially when we do not know the environmental obligations after some years.

## 3 GEOLOGY AND ORE RESERVES OF BLEIKVASSLI MINE

### 3.1 Explorations

The whole mine field of Bleikvassli has been geologically investigated for a long time by several geologists, especially by the Sydvaranger A/S mining company and later by the ASPRO A/S exploration company. The major surveying work was made by geologist I. Rui. The regional geology, petrology and mineralogy as well as structure and tectonic

problems were described very well in several reports, which give useful and sufficient information. For example the reports No. 1369, 1720 and 2083.

### 3.2 Ore formations

The Bleikvassli mine area is situated in a very complicated geological and tectonic field. The polymetallic sulphide ore horizon has a very irregular form as an isoclinal and disharmonic folded plate (flow folding area). This ore horizon has a main strike to the north-east and south-west and a dip from 60 to 50 degree against the north-west to 40 to 20 degree, locally 10-0 degree against the north-west approximately below the level Z +300 or Z +280.

By the second folding phase an antiform or a refolded ridge with an average fold axis dipping 10-15 degree to the north-west were created in the central part of the ore horizon. In the central field of this antiform there is an almost isoclinal infolded ore horizon and therefore "central ore zone", the middle ore is created in this way. This "central ore zone" is developed between the locally known vertical cross sections +260 N and +500 N and between Z +220 and Z +280 - Z +300.

The main ore body is developed on the south-eastern and inverted slope of the main refolded ridge (antiform). The local name of this part of the ore horizon is "Hoved malm". The richest part of this horizon is mined out approximately to the level Z +190 - Z +180 and to the local mine coordinate +300 N.

The production and main drifts are today in the northern ore body. This part of the ore horizon is situated on the north-western slope of the main folded ridge (antiform). This part of the ore body is explored today by some drifts to the level about Z +180.

One of the most important lithostratigraphic horizon for the ore exploration in this mine field is a substratum zone of microcline gneiss. The microcline gneiss creates almost everywhere a pseudoconform underlying rock. The overlying rock is always rich in quartz-albite and sericite, biotite containing mica schists which will increase the elasticity.

The polymetallic sulphide ore horizon of the Bleikvassli mine field is composed by three subtypes. The first type is almost a massive, medium-grained pyrite ore, often sphalerite rich, which creates the bottom part (section) of the ore horizon. The second type is a disseminated ore rich in pyrrhotite and situated in a biotite rich

mica-schist. The third ore type is also a disseminated ore with not so high content of pyrrhotite, but with more galena, pyrite and sphalerite and with a weak content of a re-mobilised chalcopryrite. The silver content is probably a little bit higher in a massive ore type (occurs often in galena and tetrahedrite and rarely together with gold like electrum).

### 3.3 Ore reserves

The last ore reserve estimate of June 1st 1989 made by O. Bakke and S. Haugen was described briefly in the local report.

This ore reserve estimate (run-of-mine) is calculated, if possible, by some of exploitation methods applied locally. The conventional ore reserve calculation has been used. Vertical cross sections (distance 20 m between each of vertical cross sections) are the base for that work. The scale of those sections is 1:2000. In most of those vertical cross sections there are not enough assays of the important metals to define the limits for the mineable run-of-mine ore against the overlying waste rock and the substratum waste rock. Assays of copper and silver are very modest and gold assays do not exist at all.

The cut-off grade was estimated at 3% of the Zn equivalent by this calculation formula:

$$\text{Zn-eq.} = 1/2 \times \text{Pb \%} + \text{Zn \%}$$

The tonnage of the run-of-mine ore was estimated by this calculation formula according to the report of 1st June 1989:

$$T = (A - A, (F)) \times I \times G$$

T = a tonnage of a block  
 A = an area of a block (m<sup>2</sup>)  
 F = a loss of run-of-mine ore at pillars  
 I = an influence distance between sections (m)  
 G = an average gravity of run-of-mine ore

Report of 1st June 1989:

1,667,000 tons of run-of-mine ore  
 (geological ore)  
 2.25% Pb, 4.18% Zn, 0.12% Cu and ca. 30.6  
 ppm Ag

Report of June 1st 1989:

1,631,000 tons of run-of-mine ore  
(geological ore, revised in March, 1990)  
2.25% Pb, 4.19% Zn, 0.12% Cu and ca. 30.5  
ppm Ag

Report of March 29th 1990:

1,228,000 tons of run-of-mine ore  
(technical ore)  
2.03% Pb, 4.01% Zn, 0.12% Cu and ca. 30  
ppm Ag

Report of March 29th 1990:

776,000 tons of in-situ proved and  
mineable ore  
2.31% Pb, 4.39% Zn, 0.12% Cu and ca. 30.5  
ppm Ag (that is 47.59% of the run-of-mine ore  
according to the report of June 1st 1989 and  
63.19% of the run-of-mine ore by the report of  
March 29th 1990)

### 3.4

#### Drilling plan

A more intensive drilling plan from the surface will be necessary to make in the near future for the north-eastern end of the Bleikvassli mine field known today. The aim would be to explore a promising metallogenetic field of "Kjökkenbukta malm" where ca. 44,220 tons of run-of-mine ore are estimated to be in two lenses by the report of 1st June 1989. Three boreholes are needed for two profiles.

The drilling plan for the mine field should be more extensive than before. It will be important to use not only diamond drilling but also slurry drilling.

1. Approximate drilling costs from the surface for "Kjökkenbukta malm", ca. 1,200 m (ca. NOK 450/m), about NOK 541,000.
2. Approximate underground drilling costs for "Nordmalm" (from the communication drift of the level about 180, minimum 3 holes in a fan) ca. 800 m, (ca. NOK 450/m), about NOK 360,000. Ca. 200 m of a drift -16 m<sup>2</sup> (ca. NOK 5,500/m), about NOK 1.1 million.
3. Approximate underground drilling costs with short diamond drilling for "Nordmalm" (should be drilled some short diamond-holes from exploration drifts). ca. 1,500 m (ca. NOK 260/m), about NOK 390,000.



4. Approximate underground sampling costs with ship/ship-channel sampling, ca. 900 samples (ca. NOK 290/m), about NOK 260,000.

Approximate total costs for the necessary exploration in the Bleikvassli mine field are about NOK 2.6 million.

#### 4 MINING

##### 4.1 Mineable reserves

Generally the ore deposit is situated in a rockmechanically good surroundings. The rock foliation results in faults and sliding planes between slab-like structures of the deposit. The stress field is distinctly orientated. The principal stress is horizontal and perpendicular to the strike of the ore body. When mining proceeds, the direction of the principal stress, in the vicinity of the mined stopes, turns perpendicularly to the ore horizon and the stress load is concentrated on pillars.

The strength of the pillars, compared to the secondary stress loads, has been sufficient in the narrow parts of the ore body, but in the thicker parts of the Hoved malm ore body rock mechanical problems can be anticipated.

The sheet structures in the footwall of the Nordmalm ore body and the pillars between open stopes will need reinforcement with long cable bolts.

Support in the mined stopes is needed to keep dilution and ore losses low. The continuous stoping in the Hoved malm increases open stopes and difficulties. The biggest stability problems will be avoided by utilising the backfilling.

For studying the economy of the mine, the mineable reserves are presented corresponding the situation on January 1st, 1990.

Ore body	ton	% Cu	% Pb	% Zn	g/t Ag
Hoved malm	1,030,000	0.12	1.78	3.64	30
Nordmalm	250,000	0.12	3.01	5.43	30
Kjökkenbukt m.	20,000	0.12	2.39	5.14	30
Total	1,300,000	0.12	2.03	4.01	30

#### 4.2 Ore production

"Nordmalm" is a regular and quite homogenous ore body. The necessary development works for long hole stoping with remote-controlled loading are almost ready. The drifts are 10 m apart along the ore and the pillars are chosen in poor points so that they will take 20% of the ore horizon and 10% of the whole tonnage.

The ore vein continues from the Nordmalm to the north-east mainly as uneconomical against the present less known "Kjökkenbukt malm" ore body. 20,000 tons of it are taken into consideration for the production.

Thickness of the "Hoved malm" ore zone varies from 10 to 30 m.

The ore is very heterogeneous and its limits are not exactly defined. Some ore will be left in pillars depending on the shape of the ore and on the location of the stopes already mined.

Problems to be faced as the production goes further:

- Ore losses will increase compared with the conventional R&P method.
- Pillars must be left according to the shape and location of the rooms which are or will be mined out, not depending on the quality of the ore.
- The open stoping method does not allow the prospecting and following of the ore limits accurately.
- The possibility of cave-in may increase loss and dilution of the ore much more than expected.
- In addition to the risk of caving-in there may be a risk of safety, too.

In many places the use of the filling in connection with the conventional R&P caving would be of advantage. The combined use of the R&P stoping together with the C&F and C&F-bench methods would give the best economical results. That will give a good possibility for a better selectivity and a higher operational reliability in the ore production.

The alternative plan of the ore production (alternative 3) is based on the use of the filling for a half of all the ore excavated in the Hoved malm ore body. In this case the ore recovery increases by 200,000 t with the same metal contents (%) as in the base alternative.

The ore production is planned for a higher level than the current production. That is based for the better economy. The amount of the ore production in 1991 is estimated to be 250,000 ton and after that 300,000 tons annually.

In the alternative of the combined backfilling stoping methods the demand of the filling material is evaluated to be 300,000 tons of waste rock. This will be got from the surface open pit of waste rock or, if possible, from the roof of the Nordmalm ore body. The waste rock will be loaded or blasted down to the mined out stopes of the Nordmalm ore body and hauled from the appropriate level to the filling point.

The base and alternative plans of the ore production are presented in App. 9 and 10.

The alternatives are as follows:

- Alternative 1    present practice
- Alternative 2    higher capacity, present costs, budget prices
- Alternative 2/S higher capacity, lower costs, higher prices
- Alternative 3    higher capacity, present costs, budget prices, cut and fill
- Alternative 3/S higher capacity, cut and fill, lower costs, higher prices

#### 4.3 Stoping and hauling

The mine started with the inclined shaft, capacity of 100,000 tons and backfilling with tailing.

Today the ramp is used in hauling, the capacity is 180,000 t and the stopes are open.

There are two main stoping areas:

- "Hoved malm"
- "Nordmalm"

The ore in the eastern Hoved malm is most folded and demands various stoping methods: the R&P and long hole stopes between the drifts are used together with the remote-controlled loading.

#### 4.4 Machines

Drilling is divided as follows:

- drifts in the ore 60%      2 Boomer H 128, H121
- long hole stoping 30%      1 Alimak, AC feeder,  
1238
- "ceilings"              10%
- other machines:              2 bolting rigs  
1 diamond drill,  
Diamec 250

Loading is remote-controlled and often the hauling distance from mine to crusher is long for lorries, which are operated by the contractor.

- 2 Toro 500 D
- 2 Cat 966 C
- 1 Wagner ST 6 C remote-controlled
- 1 Wagner ST 5      "
- 1 Wagner ST 2
- 1 Cat 950              hydraulic hammer

Service equipment:

- 4 Scania lorries L 50
- 1 MB 608 (mine bus)
- 1 Toyota pick up
- 1 Pajero 4 WD
- 2 charging tractors
- 1 Åkerman H7B, hydraulic hammer
- 1 service tractor
- 1 Volvo BM 650, scraper

BG has got a part of equipment from the Nord-Norge mine which was previously closed.

#### 4.5 Investments, costs

The mine has invested some NOK 20 million during the last 6 years (crusher, tunnel transport, ventilation, machines etc.) and there is still a need only for asphalt-macadam system and normal improvements in equipment. It may take some NOK 3 million within two years: exploration in the mine region seems to need some millions.

Last year the total costs have been NOK 223 per tonne without depreciations. About 10% of the costs have been some kind of investments, not activated. The following costs are presented in the cost report:

mine department	NOK 100/t
conc. "	" 43 "
general costs	" 80 "

The "felles" costs are NOK 50/t, mainly including housing.

The higher production level and the increase of benching will demand investments for the long hole drilling and remote-controlled loading. The mine service cars have to be changed every two years, which means an investment for a new car every year.

Waste rock stoping according to Alternative 3 will be operated by the contractor and does not demand any investments.

Investments (in addition to the investments in App. 4):

- 1 long hole drilling machine    NOK 2.0 million 1991
- 2 remote-controlled equipment  
  (for both Toro 500)                NOK 0.4 million 1991
- 3 mine cars,                    total                NOK 0.6 million 1991-93

Operating costs:

The emphasis of the ore production is changing from drifting to the cheaper long hole stoping. At the same time the need of the ore exploration will increase and take the surplus.

Waste rock stoping and hauling for the filling alternative 3 will cost NOK 25/waste ton corresponding 5 NOK/ton in operating costs. That is the price of the operational reliability and safety in production.

#### 4.6 Personnel

The personnel of the mine department is 28 hourly paid and 4 staff. The need of the higher production is 10 hourly paid and two geologist-foremen more for the control of underground stoping and ore exploration.

The additional need for the underground waste rock hauling is three men.

#### 5 CONCENTRATOR

##### 5.1 Production

In 1989, the production amounted to 176,134 tons. Operating time was 5,072 hours and feed level was 34.7 t/h. Feed contents were 2.50% Pb, 0.13% Cu and 4.60% Zn. The planned annual production for 1990 is 185,000 tons, which is the same as in two previous

years. The annual production targets have not been attained in any year. The feed level was stated to be 35 t/h, but even this has not been attained; it has changed from 33 to 34 t/h. The more likely figure would probably be 30 t/h, since the grinding product according to the information is rather coarse (23% + 65 mesh and 36% - 200 mesh), for which reason especially the zinc recovery suffers.

## 5.2 Concentrating

The equipment list and flowsheet are in Appendix 11.

### 5.2.1 Crushing

The crushing station is quite new. It is manufactured by Lokomo and was taken into use in Bleikvassli in May 1988. Initially the crushing station was obtained to the Kongen mine in Røros in 1975, where it was used only for a short time. The capacity of the crushing station is sufficient for a considerably larger production, too. As a bottleneck is the crushing bin, the capacity of which is sufficient only for about one day's feed. Enlargening of the bin by extending it is under consideration. The bin volume would be then increased to 2,000 tons, which is adequate even to a continuous operation and in any case it gives reserve for both the mine and concentrator. The cost estimate is NOK 3.3 million.

### 5.2.2 Grinding

Grinding is a conventional rod-ball mill grinding. The mills are original, from 1957, supplied by Nyhammar. They are small in size, 2.04 x 2.72 m. The rod mill has Trelleborg rubber shell lining with steel ends, the engine power is 150 kW. A Skega rubber lining is in the ball mill and the engine power is 160 kW. Wearing of rubber linings is not a problem, as it's lifetime is several years.

Grinding balls:

	1989	1988
Rods (Ovako/Fagersta)	357 g/t	328 g/t
Balls (Armco)	488 "	465 "

The balls of middling grinding have been included. Wear resistance and consumption of grinding balls show that the ore is not very abrasive.

An investment in a 2.7 x 3.6 m mill for the ball mill grinding is needed, if an increase in production capacity e.g. to 300,000 t/a (6,670 h/a and 45 t/h) and at the same time finer product are desired. The cost estimate for the installation of the mill with rubber linings, foundations and chutes is about NOK 3.3 million.

### 5.2.3 Flotation

The concentrator annual report of 1989 is appended (App. 12). The flotation machines in both the Pb and Zn flotation circuits are rather new, made in 1980, and of Sala type. Some mechanical disturbances, blockages and stoppages have also occurred in them, probably because of coarse grinding. More laboratory grinding and flotation tests are needed to find optimal grinding results and better Pb and Zn recoveries. The cost estimate for these tests is some NOK 480,000.

The machines of the Pb-Cu separate flotation circuits are old and, as stated, will no longer be used. Cu concentrate production has been in operation only during short periods in recent years. This has been because of the old circuit as well as probably of the low Cu content of the ore. If the ore had sections containing more copper, it would be profitable to renovate the separation circuit considering that the concentrate contains a fair amount of silver. The Ag content has changed yearly between 837 g/t and 1,587 g/t. The cost estimate for the OK-3 flotation machines with 4 mechanisms and for the OK-1,5 flotation machines with 2 x 2 mechanisms including steel structures, pipe lines and installation is some NOK 2.7 million.

Reagent consumption:

	1989 g/t	1988 g/t
NaCN	15	12
CuSO <sub>4</sub>	133	135
E.X. <sup>4</sup>	24	22
I.X.	28	269
ZnSO <sub>4</sub>	51	0
Lime <sup>4</sup>	1,165	1,125

The lime consumption also includes the lime used for neutralising of mine water in week-ends. In 1989 Flotanol has been used as a frother instead of TEB used earlier.

#### 5.2.4 Dewatering

The thickener capacity is sufficient for all concentrates. The Sala drum filters for the Pb and Zn concentrates are rather new. The small drum filter for the Cu concentrate is older, but can be used. Concentrate moistures were PbC 6.6% H<sub>2</sub>O and ZnC 9.0% H<sub>2</sub>O. The moisture of the Pb concentrate has fallen dramatically after the stoppage of the Cu flotation and the use of dextrine. Concentrates drop from filters directly to bins. Scraper winches load the concentrates to the trucks, which transport them 60 km from the mine to Åga, the harbour of the Mofjellet concentrator which has been closed down. The transport cost is NOK 1,669,000 in 1990 or NOK 9.02/ore ton. The Pb concentrate is sold to Metallgesellschaft in West-Germany and the Zn concentrate is sold by half and half to Metallgesellschaft and Norzink.

#### 5.2.5 Assaying

Samples are taken manually once an hour from the ore, Pb concentrate, Pb tailings, Zn concentrate and Zn tailings. Pb, Cu, Zn and Fe are analysed from them. The samples are dried, made briquettes and analysed by the Ex-met analyser on site. According to information the results can be obtained within about an hour. Chemical analysing is made in Åga, where a private laboratory owned by the firm operates in the laboratory of the previous concentrator. An on-line Courier-30 analyser and AOP with automatic sampling, pipelines and installation would cost NOK 1.8 million.

#### 5.2.6 Tailings disposal and water

The basic tailings from the concentrator as well as mine water are lead to the Kjøkkenbukta gulf of the nearby Store Bleikvatn lake. Water is pumped from the mine on an average 13.0 m<sup>3</sup>/h. The water is acidic (pH < 3) and it has to be neutralised by lime in weekends when there is a shutdown at the concentrator. The tailings have earlier been lead to the Lille Bleikvatn lake, but since 1984 to the Kjøkkenbukta gulf. NIVA (Norsk Institutt for Vannforskning) studies the drain watercourse in a routine way and especially carefully the Store Bleikvatn lake and its fish and bottom fauna as well as bottom sediments. Tailings must be stocked under the water for the prevention of oxidation both in the old and new area. It was told that the water has to be at least of five meters' depth.



Process water for the mine and concentrator is circulated from Kjökkenbukta. The amount is 210 m<sup>3</sup>/h or about 6 m<sup>3</sup>/t (mine 2 m<sup>3</sup>/t and concentrator 4 m<sup>3</sup>/t). Drinking water to the industrial area, mine village as well as to the Bleikvassli village is lead from the general network, which takes water from the bigger Rössvatn lake.

### 5.3

#### Infrastructure of the concentrator

The concentrator operates with a discontinuous three-shift work, 17 shifts per week. The production shutdown is scheduled from Saturday at 2.30 pm. to Sunday at 10.30 pm.

#### Personnel of the concentrator:

Officers		2
Shift foremen	4 x 1	4
Shift operators	4 x 1	4
Crushing operators	2 x 1	2
Repair workers	2 x 2	4
Chemical man		1
General worker		1
Total		18

If the production will be increased and a continuous operation will be taken into use, two persons more would be needed for the five-shift system.

#### Operating costs of the concentrator:

	Budgeted 1990	Realised 1989
- materials	NOK 14.62/t	NOK 12.37/t
- wages + salaries		
incl. soc. cost "	14.75/t	" 14.31/t
- energy	" 10.95/t	" 11.53/t
- contracted		
services	" 6.02/t	" 4.44/t
- general cost	-	" 0.22/t
total	NOK 46.34/t	NOK 42.87/t

The price of electric power is NOK 0.30/kWh in 1990. The concentrator consumes energy 5.75 million kWh per year or 31.1 kWh per tonne.

A flowsheet suggestion for the bigger capacity is in App. 13.

## 6 INFRASTRUCTURE

### 6.1 Landowners, royalties, claims

The concession was made in 1952 for 50 years.

The mine region is on the ground owned by the government. In 1989 the mine paid some NOK 5,000 for the leasing of ground (3 öre/ton) and NOK 34,000 for the rights.

As royalties the mine pays 1% of the net sales (to the former owner Mr. Fangell).

### 6.2 Electric power

The power agreement is made with Helgelands Kraftlag A/L for 13 GWh/a supplied to the concentrating plant.

### 6.3 Roads, telecommunications

The distance from the highway E6 to the plant is 27 km by the public road (riksveg) and less than 1 km by the communal road.

The mine has normal tele-connections (telephone, telex, fax).

### 6.4 Buildings

The mine owns 11 family houses and several barracks; 7 for 2 men, 5 for 4 men and a building for single men.

The mine's own personnel pays a perquisite rent and nothing for electricity. Outsiders pay a full rent. The mine has a program to sell the houses.

### 6.5 Personnel

The mine report of 03/1990:

	Hourly paid	Staff
Mine	28	4
Concentrator	11	5
Maintenance	12	3
Shop, office	1	4
Exploration	2	1
Part time	5	1
Temporary	3	
Total	64	18

## 6.6

## Investments for infrastructure

If the commune will be compliant to take more responsibility, no investments for infra are needed.

## 7.

## ECONOMIC ESTIMATES

## 7.1

## Revenues

The revenues of the mine are divided as follows:

Zinc	60%
Silver	20%
Lead	15%
Gold	1%
Copper	1%

There are potential chances to increase the revenues of Cu, Ag and Au; it would decrease the dependence on Zn (App. 8).

During the last years the mine has got a remarkable support from the government:

1987	NOK 14.2 million
1988	NOK 15.1 "

This has made the needed investments possible. In this study the basic figures are presented in App. 6 and 7.

## 7.2

## Capital costs

## Alternative 1 :

- In the cash flow there are no remarkable costs; in the result calculation we can use NOK 3 million per year as the depreciation.

## Alternative 2 :

- In calculations there are only the most urgent investments; additional researches are very necessary but not included in these calculations, ca. NOK 3 million.
- The investment of NOK 15 million is paid with 15% interest within three years.

### 7.3 Operating costs

In Alternative 1 - the current practice -  
the costs without depreciations are as follows:

mine department	NOK 100/t
concentrator	" 43/t
general costs	" 73/t

total	NOK 216/t
-------	-----------

In Alternative 2 it is supposed only minor  
general costs :

	NOK 50/t
--	----------

total	NOK 193/t (App. 15 and 17)
-------	----------------------------

The operation costs have increased because of the  
purchases of equipment (App. 2, 3):

1987	NOK 30 million
1988	" 35 "
1989	" 40 "

So there may be more margin to reduce the real costs.

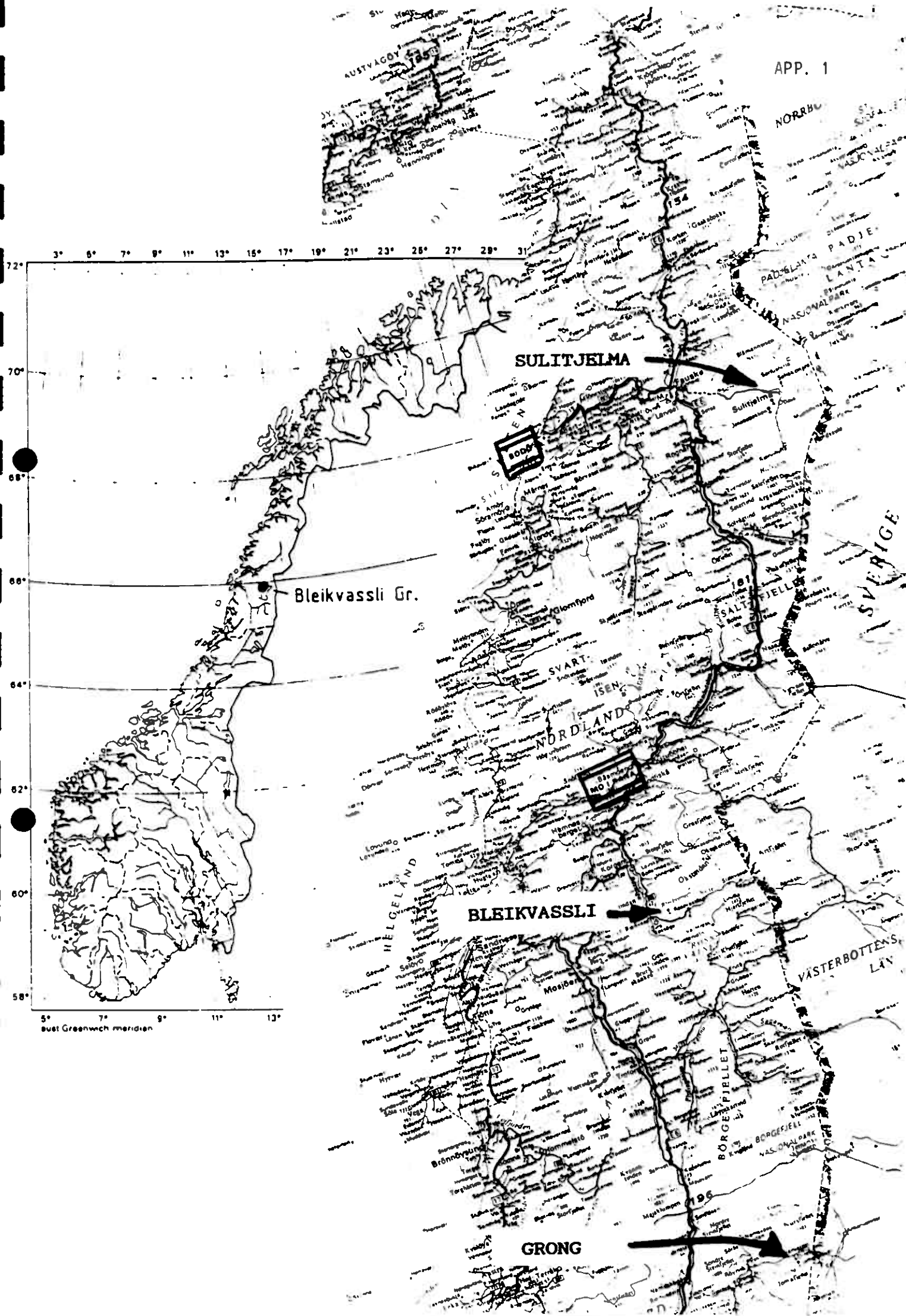
### 7.4 Sensitivity

The price of zinc has the same forecast as last  
autumn and the most important factor is the time; the  
earlier the mine increases the production the better  
chances it will have to pay the investments.

The most sensitive factor is the Zn price (App. 5),  
which is also presented in App. 17-19.

8  
APPENDICES

1	Maps
2, 3	Regnskap 1988
4	Notat, investeringer
5	Sensitivity
6	Production
7	Prices and currencies
8	Break even Zn
9	Ore production plan, alternative 2
10	Ore production plan, alternative 3
11	Dressing plant, flowsheet, 4 pages
12	Dressing plant 1989
13	Dressing plant, new flowsheet
14	Collection sheet, alternative 1
15-16	Collection sheets, alternative 2
17-18	Collection sheet, alternative 3
19	Cash flow



KULL

## RESULTATREGNSKAP

TER	TEKST	1988	1987
1	Brutto salg av produkter	37.262.462.30	30.014.672.86
	Salgsinntektsreduksjoner	<u>2.136.171.76</u>	<u>2.920.927.00</u>
	Netto produktsalg	35.126.290.54	27.093.745.86
	Beholdningsendring	<u>- 113.000.00</u>	<u>-2.593.000.00</u>
	Verdi av årets produksjon	35.013.290.54	24.500.745.86
	Salg varer og tjenester	<u>448.982.40</u>	<u>441.730.93</u>
	Sum driftsinntekter	<u>35.462.272.94</u>	<u>24.942.476.79</u>
3	Lønn og sosiale kostnader	14.575.533.52	13.767.309.52
2	Materialforbruk	9.870.553.58	7.331.351.34
4	Diverse driftskostnader	<u>10.931.426.67</u>	<u>9.283.249.80</u>
	Netto driftskostnader produksjon	<u>35.377.513.77</u>	<u>30.381.910.66</u>
8	Brutto driftsresultat	84.759.17	-5.439.433.87
5	Ordinære avskrivninger	<u>3.001.901.57</u>	<u>2.706.986.00</u>
	NETTO DRIFTSRESULTAT	<u>-2.917.142.40</u>	<u>-8.146.419.87</u>
4	12.2 Renteinntekter	633.952.45	385.318.41
6	12.5 Rentekostnader	<u>622.551.48</u>	<u>1.015.040.49</u>
7	Netto finansposter	<u>11.400.97</u>	<u>- 629.722.08</u>
6	RESULTAT FØR EKSTRAORDINÆRE POSTER	<u>-2.905.741.43</u>	<u>-8.776.141.95</u>
	Ekstraordinære avskrivninger	0.00	-5.769.281.50
2	Div. ekstraordinære inntekter	85.690.85	404.534.51
	/ Statstilskudd	<u>15.144.830.00</u>	<u>14.200.000.00</u>
6	Ekstraordinære poster	<u>15.230.520.85</u>	<u>8.835.253.01</u>
0	RESULTAT FØR ARSOPPGJØRSDISPOSISJONER	<u>12.324.779.42</u>	<u>59.111.06</u>
	Ekstraordinær DU-startavskrivning	<u>1.427.554.00</u>	<u>0.00</u>
	Netto årsoppgjørdisposisjoner	<u>1.427.554.00</u>	<u>0.00</u>
	Avsettes til skatter	<u>25.000.00</u>	<u>0.00</u>
	ARETS RESULTAT	<u>10.872.225.42</u>	<u>59.111.06</u>

## S BLEINKVASSLI GRUBER

## NOTER TIL REGNSKAPET FOR 1988

## ultatregnskapet

## Driftsinntekter

Sinkkonsentrat	kr 25.049.025
Blykonsentrat	" 11.120.245
Kobberkonsentrat	" 1.093.192
	<u>kr 37.262.462</u>
Salgsomkostninger	" 2.136.172
Sum salg produkter	kr 35.126.290
Beholdningsendringer	- " 113.000

## Produksjonsverdi

kr 35.013.290

## Salg varer og tjenester

Husleie	kr 228.288	
Tomteleie	" 250	
Salg av varer og tjenester	" 158.702	
Kommisjoner	" 61.123	
Andre inntekter	" 619	" 448.982

## Produksjonsverdi o.a. driftsinntekter

kr 35.462.272

## Lønn og sosiale kostnader

Lønninger	kr 11.471.130	
Feriepenger	" 1.362.474	
Pensjoner	" 42.287	
Godtgjørelse til styret:		
5 medl. à kr, 5000, form. kr 7000	" 32.000	
Arbeidsgiveravgift	" 1.383.063	
Andre personalkostnader	" 284.579	" 14.575.533

## Materialforbruk

Varer fra eget lager	kr 3.784.739	
Lagerført beholdning 31.12.88	" 229.733	
Uavregnet lagerinnngang 31.12.87	" 250.908	
Direktekjøp	" 5.345.063	
Frakt, forsikringer etc.	" 260.111	" 9.870.554

## Diverse driftskostnader

Elektrisk kraft	kr 3.656.220	
Reparasjoner, vedlikehold		
ved fremmede	" 1.210.829	
Konsulentonorar	" 472.963	
Kjøring, transport v/fremmede	" 3.285.754	
Diverse leier	" 49.491	
Forsikringer	" 438.056	
Fremmedytelser	" 337.149	
Diverse avgifter	" 247.357	
Adm.bistand M/S Sydvaranger	" 425.000	
Reiser, diett, bilgodtgjørelse	" 285.433	
Porto, teletjenester	" 99.190	
Royalty	" 350.132	
Andre driftskostnader	" 73.852	" 10.931.426

## Sum driftskostnader

kr 35.277.513



OB/VH

## N O T A T

Til: Ulf Smith-Meyer  
 Fra: Olav Bakke.  
 Dato: 19.2.1990.

## UTFØRTE INVESTERINGER 1989 OG BEVILGEDE INVESTERINGER FOR 1990

	BEVILGET (1000 kr)	PRIS (1000 kr)	MERKNAD
1. Toro 500 nr. II	700	620	Brukt maskin (82-mod) innkjøpt fra Statkraft.
2. Wagner ST6C m/fjernstyr.	1.600	1.620	Ny maskin
3. Ombygging av bolterigg		ca. 500	Betalt over driftsbudsjett
4. Zetor lade/servicetraktor)		138)	Ny maskin
5. Pajero gruvebil )		95)	Brukt bil (85-mod.)
6. Åkerman H7 m/hydr. hammer >	1.000	368 >	Brukt maskin m/ny hammer.
7. Ombygging av Alimak )		300)	Ombygging utført i 901.
8. Ombygging av nyrista )	ca. 395)		Betalt over driftsbudsjett
			Monteres første helg i mar
			Ikke betalt pr. 1.1.90.
9. Hydr./elektr. laderigg	800	790	Vil bli levert før 20.3.90
			Ikke betalt pr. 1.1.90.
10. Ortrigg	2.800	2.250	Vil bli levert 16.2.90.
			Ikke betalt pr. 1.1.90.
11. Gruvebiler	Ikke bevilg.	75	Betalt over driftsbudsjett
TOTALT	6.900	7.151	

Bleikvassli/Lysaker 19. februar 1990.

*Olav Bakke*

## NORSULFID GRUPPEN

App 5

## V U R D E R I N G 1990

SELSKAP : A/S B L E I K V A S S L I G R U B E R

FOLSOMHETSANALYSER ( 1000 NOK ) Alternative 3

-----  
Budsjett1990 1992  
-----

1. ENDRING I RÅMALMPRODUKSJON	= ALT 1	= ALT 2,3
10.000 tonn	798	504

## 2. ENDRING I GEHALTER I MALMEN

KOBBER...	0.1%	57	108
ZINK...	0.1%	87	82
BLY ....	"	20	33

( Zn price decreases from -90 to -93 25% and Cu 15% !)

## 3. ENDRING I UTVINNING

KOBBER.....	1 %	37	71
SINK.....	1 %	461	470

## 4. ENDRING I PRIS

KOBBER... 1	kr/kg	79	128
SINK..	"	6280	7924

## 5. REDUKSJON AV PERSONALE

gjennomsnitt. kostnader/ person / år 230

## Actual

## Budget

1988

1989

1990

1991

1992

## ORE PRODUCTION

\*\*\*\*\*

Tonnes of ore production 186891   176134   185000   250000   300000  
 +++ Cumulative ore production

\* Cu-content in or%   0.12   0.13   0.12   0.12   0.12  
 \* Zn-content in or%   4.12   4.60   4.38   4.77   3.83  
 \* Pb -content in o%   2.16   2.50   2.28   2.54   1.90

## COPPER CONCENTRATE   OBS!   Half a capacity ! (xx

\*\*\*\*\*

\* Cu - Recovery   %   15.00   21.00   21.00   21.00   21.00  
 \* Au - Recovery   %  
 \* Ag - Recovery   %

\* Cu - Content   %   17.50   14.79   14.79   14.79   14.79  
 \* Au - Content   g   8.90   8.00   8.00   8.00   8.00  
 \* Ag - CONTENT   g   1300   1300   1300   1300   1300

Cu - metal in tonnes(xx   34   30   47   63   76  
 +++ Cumulative Cu tonnes

Cu - concentratonnes   194   203   318   426   514  
 +++ Cumulative Cu tonnes

## ZINK CONCENTRATE

\*\*\*\*\*

\* Zn - Recovery   %   87.00   86.00   86.00   89.00   89.00

\* Zn - Content   %   52.60   53.28   53.28   53.28   53.28

Zn - metal in tonnes   6699   6965   6964   10622   10232  
 +++ Cumulative Zn tonnes

Zn - concentratonnes   12736   13072   13071   19936   19204  
 +++ Cumulative Zn tonnes

## LEAD- CONCENTRATE

\*\*\*\*\*

\* Pb - Recovery   %   83.60   87.00   87.00   87.00   87.00  
 \* Ag - Content   g   765.00   749.00   749.00   749.00   749.00

\* Pb - Content   %   60.00   59.26   59.26   59.26   59.26

Lead   tonnes   3375   3829   3662   5530   4972  
 +++ Cumulative Leatonnes

Lead concentratonnes   5625   6461   6180   9332   8390  
 +++ Cumulative Leatonnes

PRICES OF METALS AND CURRENCIES Versjon PKE 22.8.89  
\*\*\*\*\*

app 7

## PRICES OF METALS

		Budget				
		1988				
Currency			1989	1990	1991	1992
COPPER	USc/lb			12.30		
	NOK/kg	17.33	19.57	15.08	13.03	12.70
	Fim/kg	10.57	11.94	9.20	7.95	7.75
				9.2		7.75
ZINC	USD/ton	1500	1650	1411	1124	1058
	NOK/kg	8.56	11.80	10.16	8.11	7.62
	Fim/kg	5.22	7.30	6.20	4.95	4.65
				6.2		4.65
LEAD				1411		1058.00
	NOK/kg	4.59	5.15	4.59	3.85	3.36
	Fim/kg	2.80	2.80	2.80	2.35	2.05
	GBP/ton		460	460	460	460
GOLD	USD/troz					
	NOK/kg	96089	86802	92762	99721	106672
	Fim/kg	58614	52949	56585	60830	65070
SILVER	USD/troz					
	NOK/kg	1502	1269	1369	1418	1459
	Fim/kg	916	774	835	865	890
	GBP/tonn			1160	1160	1160
CURRENCIES / FIM	1 USD	4.20	4.20	4.20	4.00	4.00
	1 GBP	7.50	7.50	7.50	7.00	7.00
	1 SEK	0.68	0.68	0.68	0.60	0.60
	1 NOK	0.61	0.61	0.61	0.61	0.61
	1 DEM	2.35	2.35	2.35	2.00	2.00
/NOK	1 DEM	3.64	3.64	3.64	3.64	3.64
	1 USD		7.15	7.15	7.15	7.15
INFO. JFR. KONTRAK1	1 GBP		11.2	11.2	11.2	11.2
*****		1988				
Alt 2			1989	1990	1991	1992
Copper payable,Out%		100.00	100.00	100.00	100.00	100.00
Copper payable, Ou%			100.00	100.00	100.00	100.00
Cu Smelting chargeNok/t		610.00	610.00	600.00	600.00	600.00
Cu Refining chargeNok/kg		1.60	1.60	1.68	1.60	1.60
Au content payableg		7.90	7.00	7.00	7.00	7.00
Ag content payableg		735	719	719	719	719
Zn Smelting chargeUSD		161.25	219.50	219.50	219.50	219.50
Basis USD		860	1500	1500	1500	1500
Inc. treatmenUSD		15.88	15.88	15.88	15.88	15.88
Zn Smelting cNok/t		1810	1683.11	1497.21	1497.21	1497.21
Pb TC	DM/t	192	+1.5 / (900+10)			

SELSKAP :A/S B L E I K V A S S L I G R U B E R

app 8

Alternative 3

BREAK EVEN ANALYSER ( 1000 NOK )

	Aktual	Budsjett				
	1988	1989	1990	1991	1992	1993
HOVEDMETALL: SINK						
HOVEDMETALL I KONS	6699	7356	7058	10622	10232	9719
Fradrag i metallinnhold, t		1103	1059	1593	1535	1458
BETALBART HOVEDMET	6699	6252	6000	9029	8697	8261
DRIFTSKOSTNADER						
Produksjonskostn	35377	39987	41255	42000	47900	43400
Beholdningsendrin	-113	0	0	0	0	0
Total	35264	39987	41255	42000	47900	43400
REALISASJONSKOSTNADER						
Salgsinntektsred	1401	1567	2483	3788	3649	3466
Smeltekostnader	23052	22927	19570	29848	28752	27311
Raffineringskostnader						
Andre kostnader						
Bimetallinntekter						
Total	24453	24494	22053	33636	32401	30777
ANDRE PRODUKTINNTE	6193	5455	5534	8429	8166	7231
DRIFTSK.MOT METALL	53525	59027	57774	67207	72135	66945
DRIFTSKOSTNADER/KG	7.99	9.44	9.63	7.44	8.29	8.10
KAPITAL- OG ANDRE KOSTNADER						
Ordinære avskriv	3000	2000	3000	3000	3000	3000
Finansielle post	600	600	2200	1800	1350	900
Ekstraordinære p	-86	536	436	480	420	307
Skatter	25	0	0	0	0	0
Total	3539	3136	5636	5280	4770	4207
TOTALK. MOT METALL	57064	62163	63410	72487	76905	71152
TOTALKOSTNADER/KG	8.52	9.94	10.57	8.03	8.84	8.61

E.c Tot. opercosts  
+ SIR + TC (= in Zn)  
- Pb income (-TC, raff)  
- depreciations

## GRE PRODUCTION PLAN 1990

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	108 000.00	0.12	129.60	1.78	1922.40	3.64	3931.20	30.00	3240.00
NORDMALMEN	72 000.00	0.12	86.40	3.01	2167.20	5.43	3909.60	30.00	2160.00
KJÖKKENBUKTH.	5 000.00	0.12	6.00	2.39	119.50	5.14	257.00	30.00	150.00
TOTAL	185 000.00	0.12	222.00	2.28	4209.10	4.38	8097.80	30.00	5550.00

## GRE PRODUCTION PLAN 1991

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	90 000.00	0.12	108.00	1.78	1602.00	3.64	3276.00	30.00	2700.00
NORDMALMEN	150 000.00	0.12	180.00	3.01	4515.00	5.43	8145.00	30.00	4500.00
KJÖKKENBUKTH.	10 000.00	0.12	12.00	2.39	239.00	5.14	514.00	30.00	300.00
TOTAL	250 000.00	0.12	300.00	2.54	6356.00	4.77	11935.00	30.00	7500.00

## GRE PRODUCTION PLAN 1992

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	267 000.00	0.12	320.40	1.78	4752.60	3.64	9718.80	30.00	8010.00
NORDMALMEN	28 000.00	0.12	33.60	3.01	842.80	5.43	1520.40	30.00	840.00
KJÖKKENBUKTH.	5 000.00	0.12	6.00	2.39	119.50	5.14	257.00	30.00	150.00
TOTAL	300 000.00	0.12	360.00	1.90	5714.90	3.83	11496.20	30.00	9000.00

## GRE PRODUCTION PLAN 1993

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	300 000.00	0.12	360.00	1.78	5340.00	3.64	10920.00	30.00	9000.00
NORDMALMEN		0.12	0.00	3.01	0.00	5.43	0.00	30.00	0.00
KJÖKKENBUKTH.		0.12	0.00	2.39	0.00	5.14	0.00	30.00	0.00
TOTAL	300 000.00	0.12	360.00	1.78	5340.00	3.64	10920.00	30.00	9000.00

## GRE PRODUCTION PLAN 1994

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	265 000.00	0.12	318.00	1.78	4717.00	3.64	9646.00	30.00	7950.00
NORDMALMEN		0.12	0.00	3.01	0.00	5.43	0.00	30.00	0.00
KJÖKKENBUKTH.		0.12	0.00	2.39	0.00	5.14	0.00	30.00	0.00
TOTAL	265 000.00	0.12	318.00	1.78	4717.00	3.64	9646.00	30.00	7950.00

## GRE PRODUCTION PLAN 1995

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	0.00	0.12	0.00	1.78	0.00	3.64	0.00	30.00	0.00
NORDMALMEN		0.12	0.00	3.01	0.00	5.43	0.00	30.00	0.00
KJÖKKENBUKTH.		0.12	0.00	2.39	0.00	5.14	0.00	30.00	0.00
TOTAL	0.00	0.12	0.00	ERR	0.00	ERR	0.00	30.00	0.00
S U M	1300000.00								

# ORE PRODUCTION PLAN 1990

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	108 000.00	0.12	129.60	1.78	1922.40	3.64	3931.20	30.00	3240.00
NORDMALMEN	72 000.00	0.12	86.40	3.01	2167.20	5.43	3909.60	30.00	2160.00
KJÖKKENBUKTH.	5 000.00	0.12	6.00	2.39	119.50	5.14	257.00	30.00	150.00
TOTAL	185 000.00	0.12	222.00	2.28	4209.10	4.38	8097.80	30.00	5550.00

# ORE PRODUCTION PLAN 1991

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	90 000.00	0.12	108.00	1.78	1602.00	3.64	3276.00	30.00	2700.00
NORDMALMEN	150 000.00	0.12	180.00	3.01	4515.00	5.43	8145.00	30.00	4500.00
KJÖKKENBUKTH.	10 000.00	0.12	12.00	2.39	239.00	5.14	514.00	30.00	300.00
TOTAL	250 000.00	0.12	300.00	2.54	6356.00	4.77	11935.00	30.00	7500.00

# ORE PRODUCTION PLAN 1992

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	267 000.00	0.12	320.40	1.78	4752.60	3.64	9718.80	30.00	8010.00
NORDMALMEN	28 000.00	0.12	33.60	3.01	842.80	5.43	1520.40	30.00	840.00
KJÖKKENBUKTH.	5 000.00	0.12	6.00	2.39	119.50	5.14	257.00	30.00	150.00
TOTAL	300 000.00	0.12	360.00	1.90	5714.90	3.83	11496.20	30.00	9000.00

# ORE PRODUCTION PLAN 1993

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	300 000.00	0.12	360.00	1.78	5340.00	3.64	10920.00	30.00	9000.00
NORDMALMEN		0.12	0.00	3.01	0.00	5.43	0.00	30.00	0.00
KJÖKKENBUKTH.		0.12	0.00	2.39	0.00	5.14	0.00	30.00	0.00
TOTAL	300 000.00	0.12	360.00	1.78	5340.00	3.64	10920.00	30.00	9000.00

# ORE PRODUCTION PLAN 1994

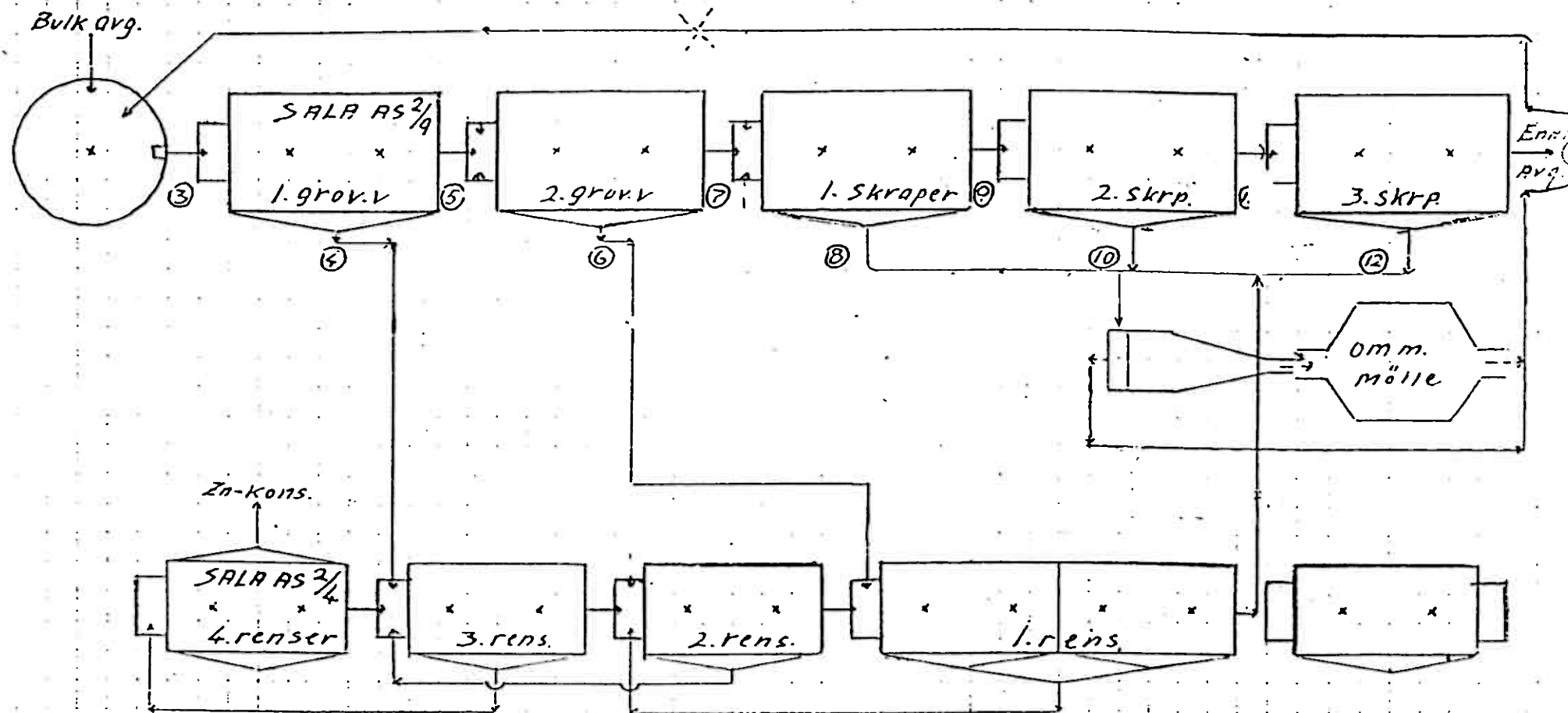
OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	300 000.00	0.12	360.00	1.78	5340.00	3.64	10920.00	30.00	9000.00
NORDMALMEN		0.12	0.00	3.01	0.00	5.43	0.00	30.00	0.00
KJÖKKENBUKTH.		0.12	0.00	2.39	0.00	5.14	0.00	30.00	0.00
TOTAL	300 000.00	0.12	360.00	1.78	5340.00	3.64	10920.00	30.00	9000.00

# ORE PRODUCTION PLAN 1995

OREBODY	t ore	% Cu	t Cu	% Pb	t Pb	% Zn	t Zn	g/t Ag	kg Ag
HOVEDMALMEN	165 000.00	0.12	198.00	1.78	2937.00	3.64	6006.00	30.00	4950.00
NORDMALMEN		0.12	0.00	3.01	0.00	5.43	0.00	30.00	0.00
KJÖKKENBUKTH.		0.12	0.00	2.39	0.00	5.14	0.00	30.00	0.00
TOTAL	165 000.00	0.12	198.00	1.78	2937.00	3.64	6006.00	30.00	4950.00
S U M	1500000.00								
	200000.00								

# BLEIKVASSLI GRUBER - FLOTASJONSVERKET

flytskjema.. 30/1-89 sinksystemet.





## KNUSERIET

Maskinene er flyttet fra Røros til Bleikvassli 1987-88. De ble satt i drift på Røros des. 1975. De ble satt igang i BG 9. mai 1988.

- 1 stk. Horisontalmater LOKOMO B 13-120X440 2V. Materen har rist for utsortering av gods mindre en 60-70 mm. Lengde 4,4 m. Bredde 1,2 m. Vekt 4500 kg. Motor 30 hk.
- 1 stk. Rotasjonsknuser LOKOMO K 100. Inntaksåpning 1000 X 800 mm med mellomleggsplate 1000 X 750/700 mm. Lengde fast knuseplate 1750 mm. Vekt 26000 kg. Motor 110 KW.
- 1 stk. Konknuser LOKOMO GE 1810. Konens diameter 1000 mm. Inntaksåpning 180 mm. Knuserplatens lengde 3150 mm. Motor 90 KW.
- 1 stk. Konknuser LOKOMO GE 610. Inntaksåpning 60 mm. Ellers som GE 1810.
- 1 stk. Horisontalsikt LOKOMO B 2100. Sikteflate ca 10 m. Antall dekk 2. Antall duker pr. dekk 4. Vekt ca 6400 kg.

## FLOTASJON

- 1 stk. Matervekt. Sala porsjonsvekt type BMV-125-C. Innkjøpt 31/3-56.
- 1 stk. Stavmølle. Fabrikat Nyhammar. Innvendig diameter i trommel 2040 mm. Innvendig sylindrelengde 2720 mm. Turtall 18 omd/min = 61 % av kritisk hastighet. Motorstørrelse 200 HK. Møllen ble tatt i bruk 1957. Motoren ble skiftet 1972. Sylinder og utløpsgavel ble skiftet i 1980. Lager og lagertapper ble skiftet i 1988. Tannkransen er snudd.
- 1 stk. Kulemølle. Samme data som stavmøllen. 22 omd/min = 74 % av kritisk hastighet. Motor 220 HK. Skiftet i 1984. Tannkransen ble skiftet 1981. Den var en del brukt.
- 1 stk. Kulemølle. Fabrikat Nyhammar. Innvendig diameter 2040 X 1720 mm. Møllen ble kjøpt brukt fra Grenges.

## KLASSERER

- 1 stk. Sala krebs hydrosyklon D 20 B. Montert 1974.
- 1 stk. Krebs hydrosyklon D 20. Utlånt fra Åga.

**FLOTASJONSMASKINER**

- 1 stk. AKER FM 5 X 2. Levert av Trondheim Mek. 1979. Motor  
2 stk. 960 O/min. 20 KW.
- 9 stk. Sala AS 2-9 K-561020-80. Levert av Maskin A/S Argo  
1980. Motorer 2 stk. pr. maskin 960 O/min KW. 11.
- 3 stk. Sala AS 2-3 K-561030. Levert av Maskin A/S Argo 1980.  
Motor 1 pr. maskin KW. 11.
- 6 stk. Sala AS 2-4 K-561050. Levert av Maskin A/S Argo 1980.  
Motor 1 pr. maskin KW. 11.

**FILTER**

- 1 stk. Sala Tromfilter TF 34 C L-321581-85. Levert av Maskin  
A/S Argo 1985.
- 1 stk. Sala Tromfilter TF 32 C. Levert av Maskin A/S Argo 1985
- 1 stk. Sala Tromfilter TF-807. Levert 1966 Nr TA-39195.

**VAKTPUMPER**

- |        |      |    |      |
|--------|------|----|------|
| 2 stk. | NASH | H8 | 1966 |
| 1 stk. | NASH | H7 | 1957 |

Motorer 3 stk. 45 KW 1470 O/min.

**PUMPER**

- |         |                 |       |              |
|---------|-----------------|-------|--------------|
| 3 stk.  | SPV             | 232   | 1978         |
| 21 stk. | SPV             | 260   | 1957         |
| 2 stk.  | BPV             | 350   | 1957         |
| 4 stk.  | SPV             | 365   | 1978         |
| 2 stk.  | SPV             | 304   | 1978         |
| 2 stk.  | SPV             | 180   |              |
| 2 stk.  | Vasa HD 507-150 | 1983. | Motor 55 KW. |

**KONSENTRATFORTYKKERE**

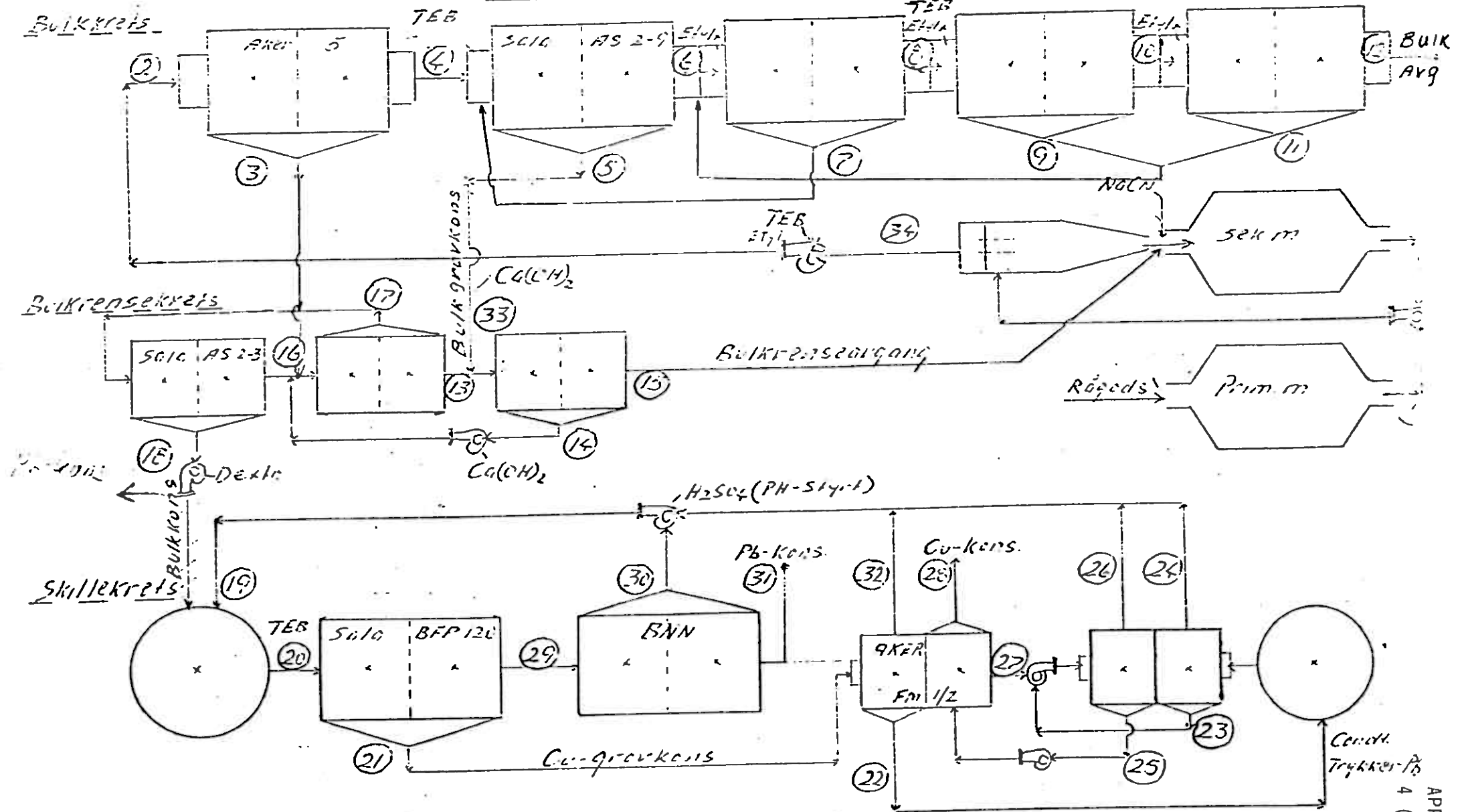
- 3 stk. Montert 1957

**BLÅSEMASKIN**

- 1 stk. Delavals Ångturbin FF-2 B4 nr. 44702 1957.

# BLEIKVASSLI GRUBER - FIDTFSJONSVERKET

Bulk-Rense-Skillekrets 16/5 - 1989



# PRODUKSJONSSTATISTIKK A/S BG PERIODE: 91 APP. 12

	Produksjon tonn	GEHALT			METALLVEKT			FORDELING		
		Pb	Cu	Zn	Pb	Cu	Zn	Pb	Cu	Zn
<b>I RÅGODS</b>										
Prod.per.	15835	2,98	0,16	5,22	472	28,2	827			
Budsj.per.	12700	2,10	0,14	4,00	267	17,8	508			
Diff.abs.	+ 3135	+ 0,88	+ 0,02	+ 1,22	+ 205	+ 10,4	+ 319			
Diff.rel. %	+ 24,7	+ 41,9	+ 14,3	+ 30,5	+ 76,8	+ 58,4	+ 62,7			
Akk.prod.	176134	2,50	0,13	4,60	4414	235	8107			
Akk.budsj.	185000	2,10	0,14	4,00	3885	259	7400			
Diff.abs.	- 8866	+ 0,40	+ 0,01	- 0,60	+ 529	- 24...	- 707...			
Diff.rel. %	- 4,8	+ 19,0	- 7,1	+ 15,0	+ 13,6	- 9,3	+ 9,6			
<b>II Pb-kons.</b>										
Prod.per.	639	66,28	1,22	6,04	424			89,7		
Budsj.per.	382	60,00	0,80	8,50	229			86,0		
Diff.abs.	+ 257	+ 6,28			+ 195			+ 3,7		
Diff.rel. %	+ 67,3	+ 10,5			+ 85,1			+ 4,3		
Akk.prod.	6481	59,26	0,97	8,65	3841			87,0		
Akk.budsj.	5570	60,00	0,80	8,50	3342			86,0		
Diff.abs.	+ 911	- 0,74			+ 499			+ 1,0		
Diff.rel. %	+ 16,4	- 1,2			+ 14,9			+ 1,2		
<b>III Cu-kons.</b>										
Prod.per.	0									
Budsj.per.	21	18,00	18,00	3,50		3,8			21,0	
Diff.abs.										
Diff.rel. %										
Akk.prod.	184		14,79			27,6				
Akk.budsj.	302	18,00	18,00	3,50		54,4			21,0	
Diff.abs.	- 118		- 3,21			- 268				
Diff.rel. %	- 39,1		- 17,8			- 49,3				
<b>IV Zn-kons.</b>										
Prod.per.	1323	1,99	0,69	54,20			717			86,7
Budsj.per.	844	1,50	0,50	53,50			452			89,0
Diff.abs.	+ 479			+ 0,70			+ 265			- 2,3
Diff.rel. %	+ 56,8			+ 1,3			+ 58,6			- 2,6
Akk.prod.	13091	2,02	0,64	53,28			6975			86,0
Akk.budsj.	12300	1,50	0,50	53,50			6581			89,0
Diff.abs.	+ 791			- 0,22			+ 394			- 3,0
Diff.rel. %	+ 6,4			- 0,4			+ 6,0			- 3,3
<b>Bulk-avg.</b>					VII Ag. g/t		Rågods	Pb	Cu	Zn
Prod.per.		0,32	0,11	5,19	Prod.per.		40	824		36
Akk.prod.		0,32	0,09	4,45	Fordelling			83,1		7,5
Zn-avg.					Prod.akk.		36	749	1366	39
Prod.per.		0,19	0,05	0,52	Fordelling					
Akk.prod.		0,16	0,04	0,36				76,6		8,1

I Driftstid

Knuser

Flotasjon

Anmerk.:

Periode

443

Budsj.

384

Utv.

Akk.

5072

Budsj.

5586

Utv.

Korreksjoner

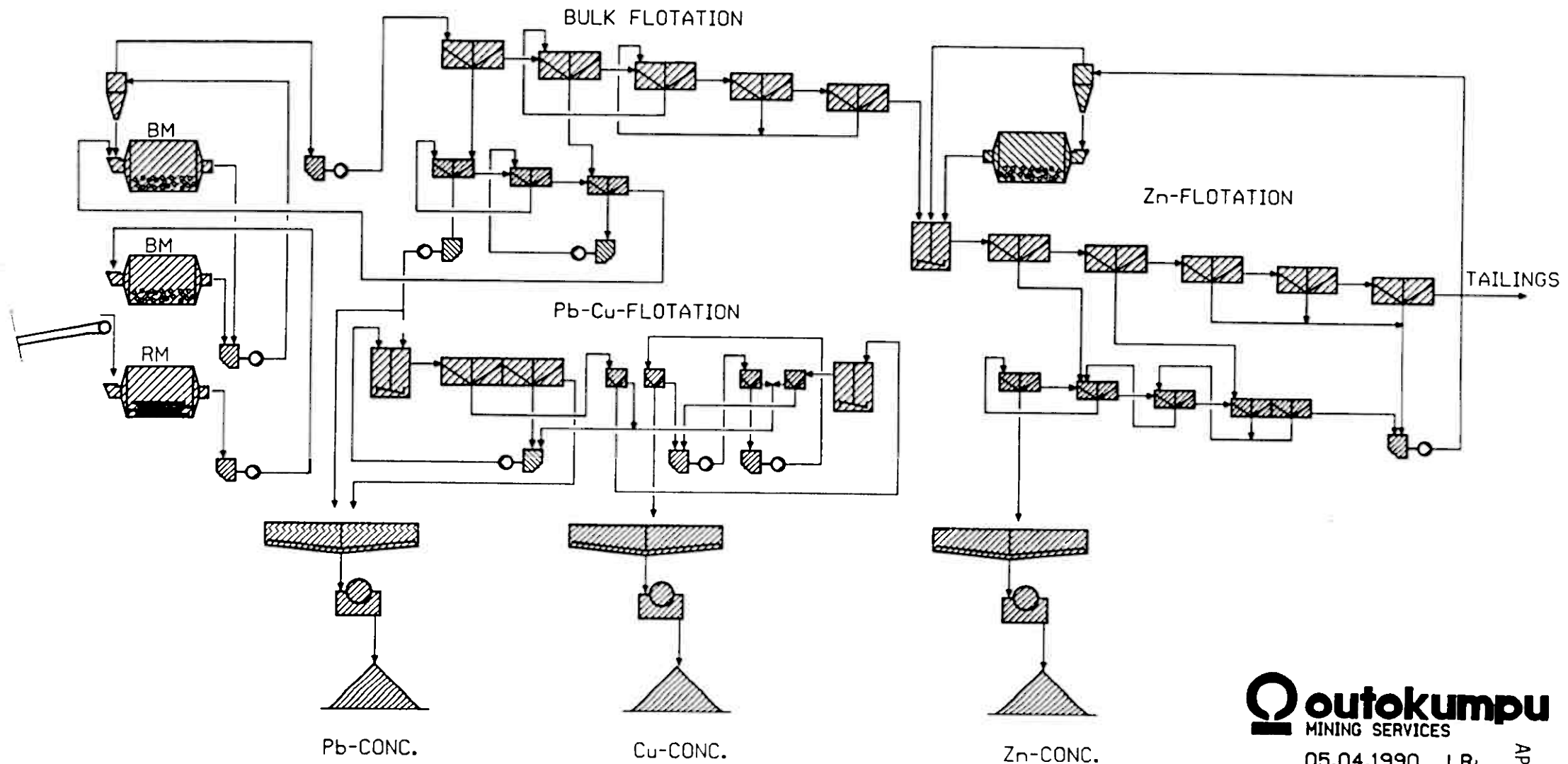
	Pb	Cu	Zn
I perioden			
Hittil i år			

Blakkvassli, 8/1-90

-8

Gjermund Øverdal

# BLEIKVASSLI GRUBER CONCENTRATOR FLOWSHEET



LEIKVASSLI GRUBER				Sammendrag		ALT 1		
24.4.90						PRESENT		
	1988	1989	1990	1991	1992	1993	1994	1995
Priser kr/kg Ag		1269	1369	1418	1459	1393	1393	1393
Cu	17	20	15	13	13	11	11	11
Zn	8.6	12.3	8.2	7.6	6.8	6.6	6.6	6.6
Pb	5	5	5	5	5	5	5	0
Net.res MNOK	-2905	8810	-12289	-16617	-20571	-22380	-22380	-16056
Net cash flow		12663	-21489	-17117	-19571	-21380	-21380	-15056
Årsbr. ton	167328	176000	185000	185000	185000	185000	185000	185000
% Cu	0.14	0.11	0.11	0.11	0.11	0.11	0.11	0.11
% Zn	4.12	3.80	4.00	4.00	4.00	4.00	4.00	4.00
% Pb	2.17	2.03	1.90	1.90	1.90	1.90	1.90	1.90
Break e kr/kg Zn		10.0	10.0	10.4	10.4	10.5	10.5	9.31
		-90-94:		-90:				
		*****		****				
Net present value	10%	-76.26		-19.5				
MNOK	15%	-67.35		-18.7				
Tot.costs NOK/t		227	223	223	223	223	223	223
Min.costs NOK/t		100	100	100	100	100	100	100
Zn FIM/kg		7.5	5.0	4.6	4.2	4.0	4.0	4.0
Cum cash flow		12663	-8826	-25942	-45514	-66894	-88274	-103330
Net sales		52378	29966	25638	21684	19875	19875	26199
Br oper.marg		12410	-11289	-15617	-19571	-21380	-21380	-15056
Value of Zn-c NOK/t		3856	2169	1896	1561	1436	1436	1954
" Pb-c		827	892	924	950	908	908	905
TC/Zn NOK/T			1497	1497	1497	1497	1497	979

## A/S B L E I K V A S S L I G R U B E R

26-Apr	TOTALS Alternative 2						BASIC	95
	-----						xxxxxxx	
	1988	1989	1990	1991	1992	1993	1994	
Priser kr/kg Ag		1269	1369	1418	1459	1393	1393	
Cu	17	20	15	13	13	11	11	
Zn	8.6	11.8	10.2	8.1	7.6	6.6	6.6	
Pb	5	5	5	4	3	3	3	
Net.res TNOK	-2905	10498	-3268	-6830	-19309	-25235	-24785	
Net cash flow		13351	-13468	-4830	-22309	-28235	-25785	
Årsbr. ton	167328	176134	185000	250000	300000	300000	300000	
% Cu	0.14	0.13	0.12	0.12	0.12	0.12	0.12	
% Zn	4.12	4.60	4.38	4.77	3.83	3.64	3.64	
% Pb	2.17	2.50	2.28	2.54	1.90	1.78	1.78	
Break e kr/kg Zn		9.9	10.6	8.9	9.9	9.7	9.7	
		-91 -94		-91 -93				
		*****		*****				
Net present value	10%	-61.65		-44.0				
MNOK	15%	-54.38		-39.6				
Tot.costs NOK/t		223	223	193	185	170	170	
Min.costs NOK/t		100	100	100	100	100	100	
Zn FIM/kg	5	7.3	6.2	5.0	4.7	4.0	4.0	
Cum cash flow		13351	-117	-4947	-27255	-55491	-81276	
Net sales		53622	43623	46687	40900	29863	29863	
Br oper.marg		13634	2368	-1563	-14500	-21037	-21037	
Value of Zn-c NOK/t		3651	3104	2176	1954	1474	1474	
" Pb-c		889	958	992	1021	975	975	
TC/Zn NOK/T			1497	1497	1497	1497	1497	

## A/S BLEIKVASSLI GRUBER

26-Apr	TOTALS    Alternative 2    SUPER							
	1988	1989	1990	1991	1992	1993	1994	
Priser kr/kg Ag		1269	1369	1418	1459	1393	1393	95
Cu	17	20	15	13	13	11	11	
Zn	8.6	11.8	10.2	9.8	9.8	9.8	9.8	
Pb	5	5	5	4	3	3	3	
Net.res MNOK	-2905	10498	-3268	14354	6655	8177	8627	
Net cash flow		13351	-13468	16354	3655	5177	7627	
Årsbr. ton	167328	176134	185000	250000	300000	300000	300000	0
% Cu	0.14	0.13	0.12	0.12	0.12	0.12	0.12	
% Zn	4.12	4.60	4.38	4.77	3.83	3.64	3.64	
% Pb	2.17	2.50	2.28	2.54	1.90	1.78	1.78	
Break e kr/kg Zn		9.9	10.6	8.2	9.0	8.8	6.8	
		-91 -94		-91 -93				
		*****		*****				
Net present value	10%	26.99		21.8				
MNOK	15%	24.75		20.4				
Tot.costs NOK/t		223	223	168	160	145	145	
Min.costs NOK/t		100	100	75	75	75	75	
Zn FIM/kg	5	7.3	6.2	6.0	6.0	6.0	6.0	
Cum cash flow		13351	-117	16236	19891	25068	32695	
Net sales		53622	43623	61771	59550	56037	56037	
Br oper.marg		13634	2368	19771	11650	12637	12637	
Value of Zn-c NOK/t		3651	3104	2959	2959	2959	2959	
" Pb-c		889	958	992	1021	975	975	
TC/Zn NOK/T			1497	1497	1497	1497	1497	



## A/S BLEIKVASSLI GRUBER

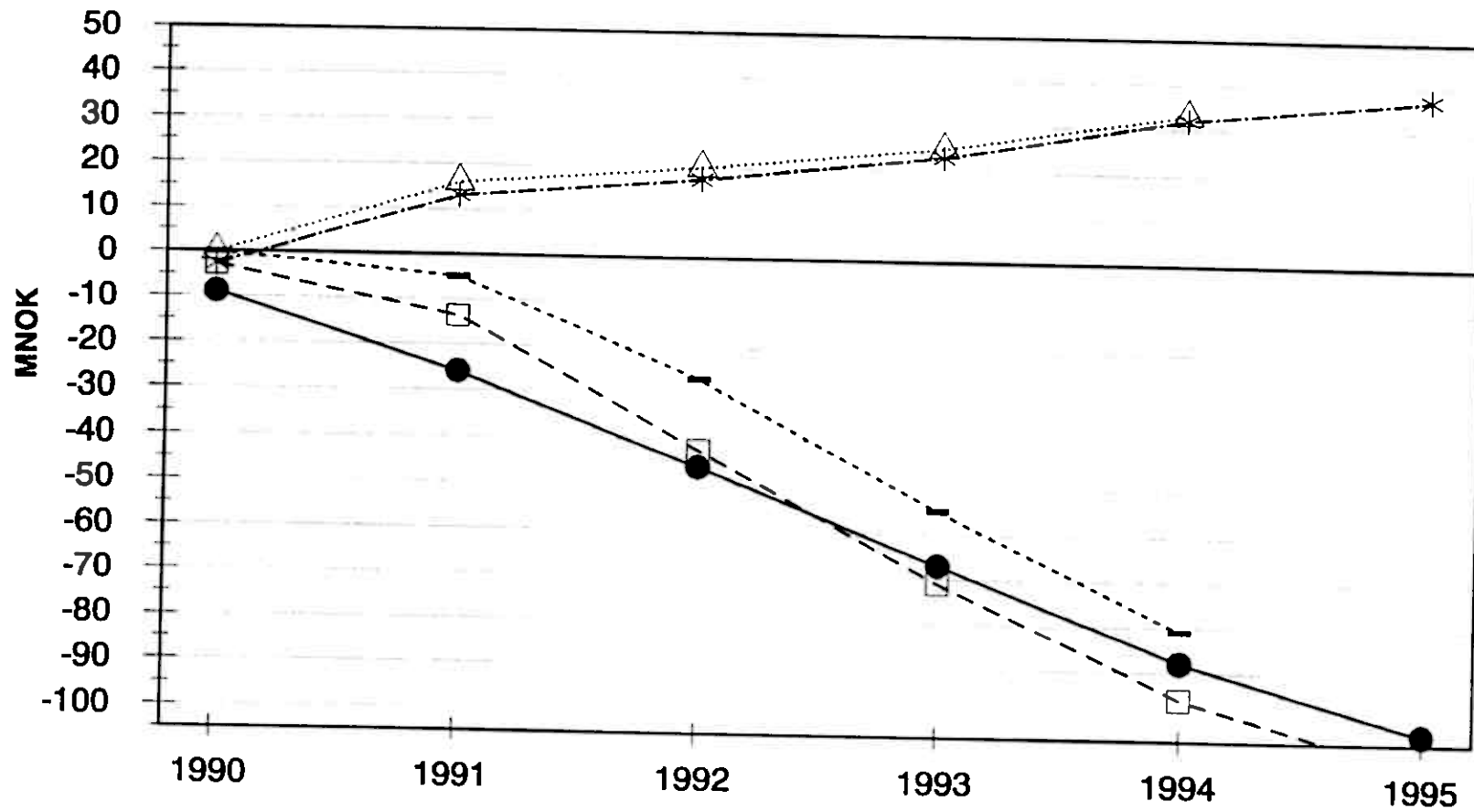
24.4.90	TOTALS Alternative 3						BASIC	
	1988	1989	1990	1991	1992	1993	1994	95
Priser kr/kg Ag		1268.85	1368.85	1418.03	1459.02	1393.44	1393.44	1393.44
Cu	17	20	15	13	13	11	11	11
Zn	8.6	11.8	10.2	7.5	6.9	6.6	6.6	6.6
Pb	5	5	5	4	3	3	3	3
Net.res MNOK	-2905	10498	-3268	-10601	-24421	-24454	-24004	-12667
Net cash flow		10751	-13468	-11001	-28621	-28654	-25004	-14667
Årsbr. ton	167328	176134	185000	250000	300000	300000	300000	165000
% Cu	0.14	0.13	0.12	0.12	0.12	0.12	0.12	0.12
% Zn	4.12	4.60	4.38	4.77	3.83	3.64	3.64	3.64
% Pb	2.17	2.50	2.28	2.54	1.90	1.78	1.78	1.78
Break e kr/kg Zn		9.9	10.6	8.7	9.7	9.5	9.5	9.3
		-91 -94		-91 -93				
		*****		*****				
Net present value	101	-72.26		-55.2				
MNOK	152	-64.34		-50.0				
Tot.costs MNOK/t		223	223	193	185	170	170	191
Min.costs MNOK/t		100	100	100	100	100	100	100
Zn FIN/kg	5	7.3	5.0	4.6	4.2	4.0	4.0	4.0
Cum cash flow		10751	-2717	-13718	-42339	-70993	-95998	-110665
Net sales		53622	43623	42878	35685	30652	30652	22128
Br oper.worg		13634	2368	-5372	-19715	-20248	-20248	-9467
Value of Zn-c MNOK/t		3651	3104	1918	1623	1474	1474	1954
" Pb-c		889	958	992	1021	975	975	1046
TC/Zn MNOK/T			1497	1497	1497	1497	1497	979

## A/S BLEIKVASSLI GRUBER

24.4.90	TOTALS Alternative 3						SUPER	
	1988	1989	1990	1991	1992	1993	1994	95
Priser kr/kg Ag		1268.85	1368.85	1418.03	1459.02	1393.44	1393.44	1393.44
Cu	17	20	15	13	13	11	11	11
Zn	8.6	11.8	10.2	9.8	9.8	9.8	9.8	9.8
Pb	5	5	5	4	3	3	3	3
Net.res TNOK	-2905	10498	-3268	16196	8479	9863	10313	6355
Net cash flow		10751	-13468	15796	4279	5663	9313	4355
Årsbr. ton	167328	176134	185000	250000	300000	300000	300000	165000
% Cu	0.14	0.13	0.12	0.12	0.12	0.12	0.12	0.12
% Zn	4.12	4.60	4.38	4.77	3.83	3.64	3.64	3.64
% Pb	2.17	2.50	2.28	2.54	1.90	1.78	1.78	1.78
Break e kr/kg Zn		9.9	10.6	8.0	8.9	8.6	8.6	8.4
		-91 -94		-91 -93				
		*****		*****				
Net present value	10%	28.51		22.2				
MINOK	15%	26.02		20.7				
Tot.costs NOK/t		223	223	168	160	145	145	166
Min.costs NOK/t		100	100	75	75	75	75	75
Zn FIN/kg	5	7.3	5.0	6.0	6.0	6.0	6.0	6.0
Cum cash flow		10751	-2717	13079	17358	23021	32333	36688
Net sales		53622	43623	63632	61342	57740	57740	37025
Br oper.marg		13634	2368	21632	13442	14340	14340	9555
Value of Zn-c NOK/t		3651	3104	2959	2959	2959	2959	3420
" Pb-c		889	958	992	1021	975	975	1046
TC/Zn NOK/T			1497	1497	1497	1497	1497	979

# BLEIKVASSLI

*cum.net cash flow*



ALT 1      ALT 2      ALT 2 / S      ALT 3      ALT 3 / S