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**PYRITES, PHOSPHATES AND CHEMICALS LTD INDIA**

**INVESTIGATIONS TO PRODUCE ELEMENTAL  
SULFUR FROM AMJHORE PYRITE DEPOSIT**

**STUDY PHASE II**

1	SUMMARY
2	BASIC DATA
3	PROCESS DESIGN
4	PLANT DESIGN
5	OPERATING DATA
6	ECONOMIC SURVEY





**1.**  
**SUMMARY**

- 1.1 Introduction
- 1.2 Process Selected
- 1.3 Economic Evaluation
- 1.4 Conclusions
- 1.5 Discussion
- 1.6 Overall Schedule for Plant Supply

1  
SUMMARY

1.1  
Introduction

The feasibility study reported in this document is the second phase of the work described in the UNIDO Contract No. 82/91 SM.

Additional information has been included based on discussions between PPCL and Outokumpu and on open questions in Final Report of Phase I of the subject study.

The purpose of the study is to calculate and present the necessary technical, operational and economical data on a metallurgical plant with utility handling facilities for feasibility evaluation for production of elemental sulphur from Amjhore pyrites.

The technical design and economical cost estimates are based on a certain process selected by PPCL of the three alternatives which were compared in the Report of Phase I.

The basic data and information for the Phase II study work was collected by Outokumpu engineers before Phase I work during their visit to India in January 1983, and in correspondence from PPCL. The data, in chapter 2, was up-dated in negotiations in Outokumpu office on 22-23th July 1985.

A sample of Amjhore pyrites was analyzed and grinding and flotation tests were made in Finland before the Phase I work of the study.

In this report, Phase II, a specification of offsite facilities prepared by FEDO FACT Engineering India, is attached in Chapter 4. The specification with prices was issued in negotiations in Outokumpu office on 23th July 1985. Some corrections in the specification were done in the meeting, some checkings and corrections are made by Outokumpu.

With the offsite facilities included, the study now covers the whole plant area.

The annual smelting capacity of the plant is 626 000 t/a (dry basis) pyrite of 39.5 % sulphur. Sulphur production is 228 000 t/a.



1.2  
Process Selected

On the basis of Study Phase I report PPCL has chosen Alternative 1 to be the most suitable alternative. The process is shortly as follows.

The ground pyrite ore and top shale materials are dried and then fed to a flash smelting furnace to be smelted in an atmosphere with excess oxygen.

On the settler part only slag is produced. The slag is tapped and granulated.

Smelting gases are reduced with coal, cooled in waste heat boiler, cleaned in eletrostatic precipitators, catalyzed to convert sulphur compounds of the gas to elemental sulphur (in two stages) and cooled to condensate the sulphur as liquid product. Finally the sulphur is purified from arsenic and prilled to final product.

Separated dusts are mixed with water and thickened. The cake is mixed to granulated slag.



1.3  
Economic evaluation

1.3.1  
Capital cost

The capital costs are estimated on overall cost basis. Outokumpu's estimate covers the cost of production facilities within the agreed scope and the cost of required off-site facilities are estimated by F&DO.

The price level is according to the first half of the year 1985.

The fixed capital is divided into the indigeneous and foreign portions, as in detail agreed with PPCL. The equipment cost of indigeneous equipment were estimated by FEDO.

The total fixed capital amounts as follows:

Foreign supplies within Outokumpu's scope	Rs 619,366,000	(39%)
Indigeneous supplies within Outokumpu's scope	Rs 849,675,000	(54%)
Off-site facilities (indigeneous)	<u>Rs 107,256,000</u>	<u>(7%)</u>
TOTAL	Rs 1,576,297,000	(100%) =====

The above fixed investment includes approx. 20 % of duties and taxes:

Custom duty of foreign supplies	Rs 249,609,000
Excise duty of indigeneous supplies	Rs 44,833,000
Sales tax of indigeneous supplies	<u>Rs 17,488,000</u>
Total share of duties and taxes	Rs 311,930,000

The working capital amounts to the Rs 79,400,000 covering the necessary inventories and liquid assets.

1.3.2  
 Financing of the investment

Based on the discussions with PPCL, the initial investment, comprehending fixed capital, interests of the construction period as well as 25% of working capital, will be financed with equity and long term debt.

The share of equity/debt will be 50%/50% and equity will be paid first before the drawing of the loan.

Financing plan of the construction period Rs 1000:

Year	Fixed capital	25% of working capital	interest of debt	Total initial investment	Equity	Debt
1	102,157			102,157	102,157	-
2	322,710			322,710	322,710	-
3	740,384		22,221	762,605	420,746	341,859
4	364,313		72,858	437,171	-	437,171
5	46,733	19,851	* * *	66,583	-	66,583
Sum	1,576,297	19,851	95,079	1,691,227	845,613	845,613

1.3.3  
 Operating cost

The estimation of operating cost is based on the operating figures received from the process calculations as well as on the experiences on the operation of Outokumpu's Kokkola pyrite smelter. The unit prices of main consumables are evaluated by PPCL.

The summarized estimation results in the following annual operating expenses:

Variable cost:	
- pyrite	Rs/a 218,750,000
- utilities and supplies	" 162,538,000
- fixed cost	" 6,654,000
Total	Rs/a 427,942,000



1.3.4  
 Revenues

Elemental sulphur and electric energy will be the products for sale.

Rs 2,573 per ton ex works has been the basic price for sulphur. This price corresponds the present price level for imported sulphur.

With full capacity the sulphur production will be 228,000 tons per annum, which results an annual sales of Rs 586,644,000.

With the nominal capacity there will be an excess power production of 7.5 MWh. With a unit price of Rs 650/MWh the annual power sales will be Rs 36,562,000.

1.3.5  
 Profitability

The Internal Rate of Return of cash flow and equity as well as the pay back period has been used as a character of profitability.

The profitability is calculated for four cases:

Case 1: The plant will operate with the nominal capacity and the costs and revenues are as shown in items 6.1-6.3.

Case 2: As case 1., but the production rate will be 90 %.

Case 3: The revenues are estimated with such a sulphur price that the internal rate of return of cash flow will result in 12%.

Case 4: Calculation of "economic IRR". The investment and operating costs are without duties and taxes. It has been assumed, that the transfer price of pyrite as well as the other operating costs (excluding wages and salaries) contains 5 % of different taxes.

Annual gross margins of the cases, Rs 1000/a:

	Case 1.	Case 2.	Case 3.	Case 4.
Revenues	623,207	560,886	722,936	623,207
<u>./. Operating cost</u>	<u>427,942</u>	<u>394,689</u>	<u>427,942</u>	<u>406,966</u>
Gross margin	195,265	166,197	294,994	216,241

**Annual cash flow, internal rate of return and pay back period**

The cash flows, presented in appendices 6.1-6.4, give the following results:

	IRR of cash flow	IRR of equity	Pay back period
Case 1.	6.5 %	1.1 %	13.3 years
Case 2.	4.7 %	negative	48.5 years
Case 3.	12.0 %	10.8 %	6.4 years
Case 4.	10.5 %	8.8 %	7.2 years

In case 4. the IRR of cash flow of 12 % is resulted with a sulphur price of Rs 3,010.40 per ton.

**Sensitivity analysis**

The sensitivity analysis, regarding the most important project variables indicates, that the profitability is very sensitive in respect to the sales price of sulphur as well as to the plant operating cost. The sensitivity analysis is in details shown in section 6.

**1.4  
Conclusions**

The results of profitability calculations show, that with the present sulphur price the project is economically not very attractive.

The production process is based on proven technology and it seems to be no technical ways to effect essentially to the investment or operating cost of the plant.

Two very remarkable variables in the cash flow are the sales price of sulphur and the transfer price of pyrite. In case 12 % is an acceptable limit for the IRR of the cash flow, that can be achieved with the present price level, if the ex work price of sulphur will be more than Rs 3,000 per ton or, alternatively, the transfer price of pyrite could be decreased to Rs 210 per ton instead of the present Rs 350 per ton.



1.5  
Discussion

In review meeting of Phase I Draft Report between PPCL and Outokumpu on 12 to 16 September 1983 in Espoo, Finland, several questions were raised for discussion.

Most of the questions were answered in Phase I Final Report. To questions that were left open comments and answers are given below.

1.5.1  
Arsenic Removal

As stated in the final report of Phase I, considerable cost savings can be made if the washing need not be done.

When preparing the Phase II Draft Report, Outokumpu representatives had no information of Indian standards and regulations for allowable arsenic content of sulphur. Thus washing and waste handling equipment are included in the extent.

If, however, the washing in autoclaves is not needed, there will be some savings in capital costs.

Additional cost savings would, of course, be reached in utility and maintenance costs.

1.5.2  
Slag Removal

Slag tapped from the flash smelter furnace is in this Phase II proposed to be granulated, as in Phase I.

This system is selected because the investment costs are relatively low, and the granulated product is easy to handle i.e. no big vehicles and ladles are needed.

1.5.3  
Parallel Equipment

Replacing of parallel units with fewer bigger units would save investment cost. However, following respects are to be concerned.

Multicoil Dryers

When using only one multicoil unit instead of two the equipment size would be so high that there would be a risk in the reliability of the dryer.

In addition, in two unit case, half of the drying capacity can be operated in case of some failure in one unit and thus increase the annual production.

#### Electrostatic Precipitators

In case of only one precipitator gas flow into the unit would be appr. 214 000 Nm<sup>3</sup>/h. This flow is rather high to be handled by one precipitator unit due to certain standardization of precipitators.

In addition, in case of two units, reduced production can be continued even if one unit is out of order or being maintained or repaired.

#### Cold Catalyzers

All three catalyzers - hot and cold catalyzers- are proposed to be same size. It is estimated that supplying three similar units would not be more expensive than one smaller (hot catalyzer) and one bigger cold catalyzer due to equipment design and manufacturing costs.

Maintenance and operation will also be easier with three similar units.

#### Sulphur Condensing Towers

With two parallel condensing towers better pressure control in cold catalyzers - and that way operation control - can be reached.

In addition, start-up from cold stage is easier when having one unit heated first with reduced gas flow and partial sulphur production started with this unit.

#### Liquid Sulphur Cooling Boilers

Necessity of the boilers was discussed between PPCL and Outokumpu in meeting on 12 th to 16 th September, 1983 in Espoo. Outokumpu have reduced the number of boilers from four to three. Still fewer unit system is not reasonable due to the structure of the boilers.

#### Process Air Fans, Process Gas Fans

Process air and process gas fans are recommended to be parallel units, capacity of one being some more than half of the total process flow.



In case of failure in one fan, reduced production can be continued with the other unit.

With smaller units it is also easier to find cheaper equipment in standard models.

Slag Granulation Equipment

Two unit system is recommended for operational reasons. Four tapping holes and launders are proposed, two per each granulation basin. For operation it is reasonable to have several tapping holes assembled; if there are difficulties with one hole, another can be used. Even if some disturbances occur in granulation equipment or rake classifier the other system can be used and sulphur production continued. Normally only one granulation system is in operation.

Pumps

Pumps are proposed to be two or three parallel for flexibility and safety in operation.

1.5.4

Grain Size of the Feed Material

Concentrates

Standard recommendation for sizing of flash smelter concentrates is 100 % minus 16 mesh (1000 microns) and 50-90 % minus 200 mesh (74 microns). Most typical sizing used is 100 % minus 65 mesh (210 microns) and 60-90 % minus 200 mesh.

Coarser ground pyrite 100 % minus 50 mesh (297 microns), 70 % plus 70 mesh (210 microns) and 18 % minus 200 mesh has been tested twice at the pilot plant of Outokumpu in Pori with negative results. Part of the material remained unsmelted, specially the gangue material. The matte and slag did not separate and were nearly impossible to tap. On the bottom of the furnace build-ups were formed causing difficulties in the operation.

Silica (Top Shale)

Standard recommendation for silica flux for flash smelters is based on normally used natural sand:

100 %	- 4 mesh	(4760 microns)
90 %	- 16 mesh	(1000 microns)
80 %	- 28 mesh	(595 microns)

There are references for somewhat coarser flux, e.g. in Outokumpu Harjavalta copper smelter sizing of sand used successfully is:

96 %	- 3 mesh	(6730 microns)
50 %	- 28 mesh	( 595 microns)
3 %	- 150 mesh	( 105 microns)

Many smelters are using crushed silica with typical sizing of 100 % minus 9-16 mesh (1-2 mm).

Sizing of silica is not as critical as for concentrates. Flux is mostly inert material in the reaction shaft. Slag reactions take place mainly in the settler.

#### 1.5.5

##### Stack Emission of Sulphur Compounds

Using incinerator furnace and gas scrubbing with water and lime stone slurry  $H_2O$  and  $SO_2$ -content of the exhaust gas can be reduced to values none and 0.05 %, respectively.

#### 1.5.6

##### Sulphur Prilling

In Vienna meeting on 29th November 1984 between PPCL, UNIDO and Outokumpu, PPCL's representatives expressed their desire to prill the sulphur instead of casting. Prilling was even earlier recommended by Outokumpu.

#### 1.5.7

##### Starting of Oxygen Plant 9 MW Motor

In negotiations on May 16th '85 in Outokumpu office a question was raised of conditions to start the big motor of oxygen plant. As other possibility a steam turbine was proposed.

The electric motor can be started by supplying an additional starting reactor (which is included in equipment) and in the following conditions:

- short circuit capacity of the 110 kV feeder point is minimum 1500 MVA (not known to Outokumpu)
- power plant generator is running on some load
- allowed voltage drop in 11 kV switchgear is at least 9 %.



The disadvantages of using turbine motor refer mainly to possible shortages in steam supply. Oxygen plants technology prefers long operation periods, even with small loads and during short steam shortages. By using an electric motor the operation can be kept on with power from the electric network.

#### 1.5.8 Oxygen enrichment

The smelting process is designed to use oxygen enriched process air. Total oxygen percentage is 35 %.

Reason for use of oxygen enrichment is mainly the smelter gas flow rate. In case of 35 % enrichment the gas flow from smelting is 80 000 m<sup>3</sup>/h and in pure air smelting with the same pyrite feed about 250 000 m<sup>3</sup>/h. Smelting air flows are 81 000 and 240 000 m<sup>3</sup>/h, respectively. Auxiliary fuel oil is needed about 11 t/h in pure air case. Sulphur losses in exhaust gas increase with bigger gas flow.

Gas and air flow rates are in pure air case so enormous that two parallel smelting and sulphur separation lines should be supplied.

Operation control of smelting is easier in the oxygen enrichment case, especially smelting temperature control, because only smelting air oxygen percentage is to be controlled and no auxiliary oil burner control is needed.

In copper smelting use of oxygen enrichment also decreases formation of build-ups in the flash furnace.

According to Outokumpu's experiences wear of brickwork lining of flash smelting furnace is much lower when using excess oxygen. In Outokumpu's Harjavalta copper smelter the brickwork needs to be repaired only every 4-5 years.

#### 1.5.9 Effluents

The main effluents from the process are as follows

##### Slag granulate and flue dust

Flash smelter furnace slag is granulated with water and conveyed to a heap.



Smelting flue dust, separated from gas stream in waste heat boiler and electrostatic precipitators, is slurried with water, precipitated in a thickener and the underflow pumped to the scraper conveyor of slag.

From the heap the slag and flue dust waste can be carried off by e.g. front end-loader, used as filling material and covered by soil.

Total amount of slag and flue dust to the heap is about 94 t/h, water amount of which is about 17 t/h.

Main components of the slag are:

Fe	45	%
SiO <sub>2</sub>	32	%
Al <sub>2</sub> O <sub>3</sub>	6	%
S	1.6	%

and of the flue dust:

SiO <sub>2</sub>	31	%
Fe	22	%
Al <sub>2</sub> O <sub>3</sub>	12	%
C	10	%
S	6	%

#### Sulphur washing wastes

Effluents from the sulphur autoclave washing water handling are

- filter drum cake
- overflow water

Filter drum cake formation rate is 370 kg/h of which moisture content is 110 kg/h. Insoluble As<sub>2</sub>S<sub>3</sub> is 2 % of solid material, the rest being elemental sulphur and gypsum.

The cake can be carried to a special storage area, built e.g. of concrete.

The overflow water flow rate is 9-10 m<sup>3</sup>/h. Its pH-value is about 3 and As-content 16 mg/l.

If the authorities of India do not allow it to be pumped to drainage, an evaporation pond can be built. The area of the pond should be about 700 m<sup>2</sup>. The bottom should be of concrete, covered by elemental sulphur.

Dried solid material is every now and then gathered from the bottom of the pond. The pond price is not included in economic evaluation.





### Exhaust gas

The flow rate of exhaust gas out from the stack with the nominal capacity of the plant is 180 000 m<sup>3</sup>/h (NTP) and its temperature is 60 °C.

### Gas analysis is

CO	0.11 %
SO <sub>2</sub>	0.05 %
H <sub>2</sub> O	23.6 %
CO <sub>2</sub>	17.3 %
O <sub>2</sub>	1.3 %
N <sub>2</sub>	57.6 %

### Boiler blow-down steam

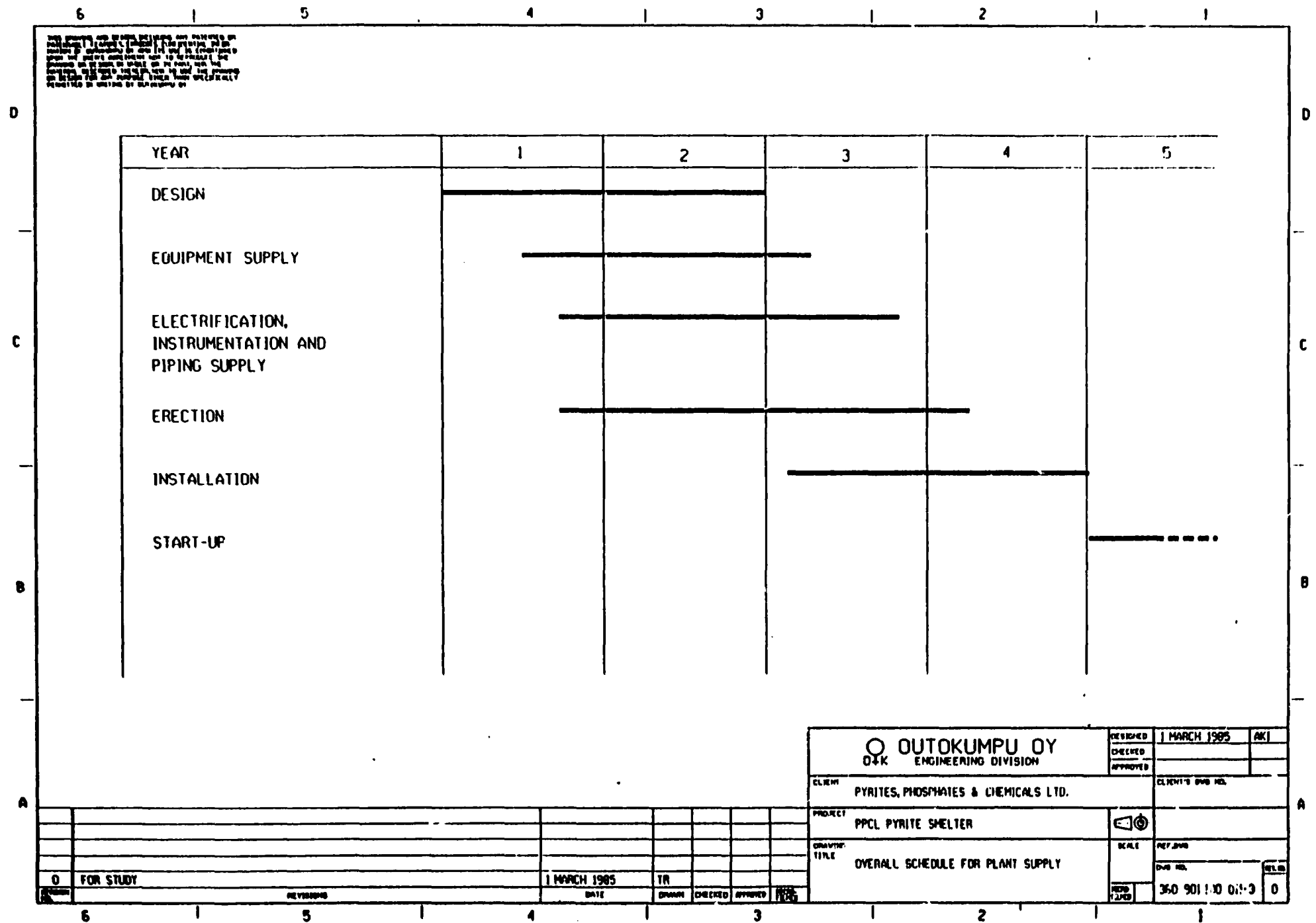
Medium flow rate of blow down from the boilers to the blow down tank is about 8 t/h. However, the stream is not constant, it varies according to the need of blow down.

The condensate from the tank (80-90 °C) can be directed to drainage, or it can be used to heating or drying purposes. The use of the water needs however more detailed design.

### 1.6 Overall Schedule for Plant Supply

Bar Chart Schedule,  
Dwg No. 360 901 100 C11-3 Rev0

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<b>OUTOKUMPU OY</b> O.K. ENGINEERING DIVISION		DESIGNED: 1 MARCH 1985 CHECKED: APPROVED:	AKI
CLIENT: PYRITES, PHOSPHATES & CHEMICALS LTD.		CLIENT'S DWG NO.	
PROJECT: PPCL PYRITE SMELTER			
DRAWING TITLE: OVERALL SCHEDULE FOR PLANT SUPPLY		SCALE:	REF. DWG:
DATE: 1 MARCH 1985		DWG NO.:	REV. NO.:
0	FOR STUDY	350 901 10 01:3	0
DATE	DRAWN	CHECKED	APPROVED

NO.	REVISIONS	DATE	DRAWN	CHECKED	APPROVED	FILED
0	FOR STUDY	1 MARCH 1985	TR			





2.  
BASIC DATA

- 2.1 Plant Site, Raw Materials, Utilities and Consumables,  
Cost Data
- 2.2 Raw Materials



2.1  
Plant site, raw materials, utilities and consumables,  
transportation, cost data

See the following attachment:  
SITE DETAILS OF AMJHORE AREA AND INDIAN  
COST DATA OF SOME IMPORTANT ITEMS

SITE DETAILS OF AMJHORE APRA AND INDIAN  
COST DATA OF SOME IMPORTANT ITEMS

*All hand made  
corrections were  
agreed in meeting  
between PPCL/FEDD/  
Dutokumpu on  
22-23<sup>th</sup> July 85.*

1. LOCATION OF THE INDUSTRIAL AREA : AMJHORE, DISTT. ROHTAS, BIHAR, INDIA
- 1.1 General Plant Area : Map attached  
(map/air photograph)
- Road and railway net: A metal road exists that leads to the nearest town and Railway head at Dehri-on-Sone, (Eastern Railway) about 35 Kms. away. The Company has its own railway siding facilities at this Railway Station where 35 wagons can be accommodated.
- Electric line net work : 440 V-AC, 50 Hz, 3 Ph
- Town areas : Nearest town - Dehri-On-Sone  
( 35 Kms. away )
- Harbours : Nearest Harbour : Calcutta  
(575 Kms. away)
- 1.2 Industrial Area : Map attached  
(map, scale approx. 1:2000)
- Ground elevation : 165 M.S.L.
- Road and Railway connection : As given at 1.1
- Connection for water supply and water discharge: Tubewell water supply exists and discharge is to the nearest river (about 4 Kms. away) through natural water course.
- Connection for electric supply. : The layout of over-head line has been shown in the map.
- Dumping areas : About 240 hectare around project site.
2. PLANT CONDITIONS
- 2.1 Existing services at the area (if any) : Transport facilities available. A metal road is available at project site.

2.2 Steam

Layout of existing system : Not existing at present.  
Diagram of existing system  
Connection Points  
Steam temperature  
Steam pressure  
Amount available

2.3 Plant air(compressed air) : 3 sets of electrical compressors each(2250 cfm, 110 psi) are available and one diesel portable compressor(250 cfm, 100 psi) is available which meet the requirements of mines). There is no surplus capacity.

MAKE

ER - 8 Atlas Copco(Sweden)  
Reciprocating Type Compressors  
435 HP each.

2.4 Water(fresh water, cooling water)

Cooling water : Exists for only compressors  
Fresh water :

Layout of existing system : Fresh water from tubewell is used. Layout as per map.

Diagram of existing system:  
Connection points  
Amount available

: At present we are getting water from four tubewells, about 2.7 mill. litres per day. This can be further increased to meet the additional requirements.

Analysis

a) chloride content : 0.47  
in mg/100 gm.  
b) sulphate content : 200 ppm  
c) pH : 6.5

- d) Turbidity : 5 ppm
- e) Total hardness : 432
- f) Total solid : 480
- g) Average water temp.: 25°C
- h) Max. water temp. : 30°C

## 2.5 Sewage

- Locations : Main open natural drainage channel
- Capacities : is connected to Sone River, which is about 4 Kms. away.

## 2.6 Fuel Oil

- Layout of existing system : HSD oil and petrol tank is installed in the project site.

Diagram of existing system

Oil pressure

Connection points

- Capacity of storage tanks : Tank for HSD oil and petrol having 15000 litres capacity each.

## 2.7 Electricity

- Layout of existing system : Shown in the map

Diagram of existing system

- Voltage, phase and frequency for various efficiency range of motors, lighting and instrumentation. : 11 KV transmission lines are existing between the main receiving stations and various sub-stations.

Also existing - 3.3 KV, 3 ph, 50 Hz synchronous induction motors for the compressors.

- plan enclosed.

- 550 V, 3 ph, 50 Hz squirrel cage/slipring, induction motors for mining/crusher installations.

440 V, 3 ph, 50 Hz induction motors for surface and workshop installations.

440 V, 3 ph, 50 Hz, 4 wire over-head line for surface lighting.



## 2.8 Instrumentation

- Information on existing system : Pneumatic equipments other than compressors are not having any instrumentation.
- Pneumatic or electrical : Sub-station panels and some of the starters are having ammeters and voltmeters only. For domestic consumption single phase energy meters are provided.

## 2.9 Existing infrastructure at the plant areas.

- Road : Metal road is existing at the project site which connects all the working places.
- Railways : A broad gauge railway facilities exist at about 35 Kms. from the project site at Dehri-on-Sone. There is a proposal to extend the broad gauge railway line from Dehri-on-Sone to project site.
- Repairshop : A good repair & workshop is available. Workshop is provided with Lathe, drilling, grinding, welding machines etc. for the present requirements. However, extra facilities can be provided if required.
- Storing house : A Central store is available in which about Rs.50 lakhs (fifty lakhs) inventory is kept dealing with about 15000 items. Further, house capacity can be provided.
- Laboratory : A small laboratory is available with the facilities to analyse Iron, Sulphur, Silica, pH etc. Further facilities can be provided.
- Office rooms : A good office facilities exist having sufficient number of rooms.

## 3. ENVIRONMENTAL DATA

- 3.1 Plant elevation from sea level : 165 M.S.L.

....5/...

**Soil**

Type of soil : Sandy soil

**Soil loading**

Natural : 200 kN/m<sup>2</sup> (safe bearing capacity at 2 mtrs.  
Design : below the ground level on 600 x 600 mm  
plate.

**Level of steady soil**

**Ground water**

Water level : At a depth of about 12 meters from ground  
level on the eastern side of the project  
boundary. As we approach towards the hill  
the depth of water table increases.

**Bed rock**

Level : 12 to 18 meters.

Type of surface : Lime stone/sand stone.

**3.3 Earthquake zone**

Probability : Nil

Intensity in Richter: Not applicable  
scale

**4. ATMOSPHERIC DATA**

**4.1 Monthly air temp.**

Average : 35°C

Max. : 50°C (during summer)

Min. : 4°C (during winter)

**4.2 Air pressure**

Average : Normal

Max. : Not available

Min.

**4.3 Relative humidity**

Average :

Max. : 80% at 40°C during rainy season  
(July - August period)

Min. :

4.4 Rainfall and momentary  
and daily extremes

Rainfall : 1691 mm in 1980  
1045 mm in 1981

4.5 Wind

Velocity

Average : 90 Km per hour - maximum

Design

Prevailing direction : South-West to North-East.

5. TRANSPORT DATA

5.1 Road and railway net : Main road leading to Dehri-On-Sons.

5.2 Location of harbours : Calcutta Port - 575 Km away

5.3 Harbour limitations : No limitation

5.4 Weight limits

Roads : No limitation

Railways : Standard wagonload  
4 wheeler - 24 M.T.  
6 wheeler - 55 M.T.

5.5 Size limits

Roads : Maximum width - 5 metre

Railways :

6. DATA FOR PROCESS AND  
PLANT DESIGN

6.1 Design capacity of the  
smelter.

Annual feed of pyrite : 626,250 M.T.

6.2 Design capacity and design:  
philosophy of the power  
plant. Most of the requirement of complex  
and complete requirement of smelter  
will be met through captive power  
plant.

6.3 Pyrite

Chemical assay : Given separately in the enclosed  
Mineralogical analysis sheet.  
Moisture  
Grain size, screen analysis

- 6.4 Purity requirement of sulphur product : Free from arsenic I.S.I. Standard 99.9% 'S'.
- 6.5 Final form of sulphur : Prilled
- 6.6 Storing volumes of raw materials, utilities and products. : Coal - 15 days requirement  
Water- One day requirement  
Fuel Oil - 10 days requirement.
- 6.7 Analysis, temperature and availability of water.  
Sanitary water  
Process water  
Cooling water
- 6.8 Analysis and availability: of lime and limestone :  $\text{CaCO}_3$  - 80%  
 $\text{SiO}_2$  - 7%  
 $\text{R}_2\text{O}_3$  - 1.5%
- 6.9 Fuels available (fuel oil coal natural gas)  
Type  
Net heating value  
Ultimate weight analysis of coal.
- 6.10 Buildings : Constructions and materials available.  
Pilling : Not required  
Frame of buildings : Steel frame  
Covers and roofing : Asbestos sheet
- 6.11 Electrification  
Electric power available for the plant  
Voltage selection  
Feed of main transformer  
Distribution voltage  
Drive of standard motors  
Drive of big motors, over 350 KW

Frequency

Failures in electric power feed	Month	No. of tripings	Duration of power off
Breaks	: Oct. '82	20	7 hours
	Nov. '82	28	19 hours
	Dec. '82	10	2 hours 24 mts.
Fluctuation of voltage	: 460 to 380 volts.		
Fluctuation of frequency $\pm$ %			

6.12 Instrumentation

Pneumatic or electrical system : Pneumatic preferred.  
Voltage and frequency in control and in feed of the instrumentation equipment  
Recommendations concerning the manufacturing of instrumentation

6.13 Requirements for environmental protection

Permissible limits of gas emission to the atmosphere.

Sulphur dioxide : 4 Kg./Tc. of 100% acid produced  
Sulphur trioxide : 0.5 Kg./Tc " "  
Carbon monoxide ) : Follow EPA Standards  
Hydrogen sulphide )

7. LOCAL UNIT PRICES FOR CAPITAL COST ESTIMATE

7.1 Building and construction work

Unit prices for the following:

- Piling(50 M long, 660 mm dia) : fs. <sup>52,000</sup>~~27,000~~ / per each

- concrete mass, ready installed including boarding and steel reinforcements.	Foundation Column Slab Beam ... Rs. <del>2,250/m<sup>3</sup></del>	Rs. 1,300/m <sup>3</sup> Rs 2,800/m <sup>3</sup> Rs 1,850/m <sup>3</sup> Rs 2,100/m <sup>3</sup>
- supporting steel constructions ready installed, painted	... Rs. 8,000/Te.	10,000/t
- walls and roofings of industrial buildings	... Rs. 100/m <sup>2</sup>	65/m <sup>2</sup>
- offices, change rooms	... Rs. <del>1,200/m<sup>2</sup></del>	1,500/m <sup>2</sup>
- earth excavation	... Rs. 15/m <sup>3</sup>	11/m <sup>3</sup>
- earth filling	... Rs. 15/m <sup>3</sup>	20/m <sup>3</sup>
- rock blasting	... Rs. 50/m <sup>3</sup>	35/m <sup>3</sup>
- asphalt covers	... Rs. 100/m <sup>2</sup>	

7.2 Equipment and materials

... Materials and manuf. Transport and erect.

- Mild steel construction, ready installed	Rs.	Rs.
- sheets	20/kg	32/kg
- profiles	30/kg	32/kg
- Acid proof steel sheets construction, ready installed	180/kg	32/kg
- Plastics		
- pvc		150/kg
- reinforced plastics	100/kg	150/kg
- PE	10/kg	
- Lead lining, ready installed		
- sheet lining(3 mm thick)	1100/m <sup>2</sup>	
- homogenous lining	5000/m <sup>2</sup>	
- Heat insulation, ready installed inc. covers.		
- thickness 100 mm	350/m <sup>2</sup>	400/m <sup>2</sup>
- thickness 200 mm	550/m <sup>2</sup>	600/m <sup>2</sup>

....10/...

- Painting (ordinary) ... 25/m<sup>2</sup>
- Rubber lining, ready installed ( 3mm) ... Rs. 600/m<sup>2</sup>
- Copper profiles and sheets

Constructions(ready installed)

	Materials and manuf. Rs.	Transp. and errec. Rs.
- Service platforms, stairs etc. of mild steel ...	15/kg	3 1/2/kg
- Tanks, bins etc. of mild steel. ...	20/kg	3 1/2/kg
- Tanks of acid proof steel ...	180/kg	
- Tanks of reinforced plastics..	<del>80/kg</del> 125/kg	3 1/2/kg
- Gas ducts of mild steel ...	20/kg	3 1/2/kg

Examples of the prices of available equipment, main technical data specified:

- Pumps

- type - horizontal, centri-fugal.
- capacity 25 m<sup>3</sup>/hr. ... 29,000.00
- pressure 50 MLC ... ~~Rs. 18,310.00~~ 10%
- material SS 316
- electric power 10 HP drive

- Belt conveyors

- type-horizontal, troughed, three roll ground conveyor ... 1,000,000.00 10%
- capacity 200 TPH ... ~~Rs. 345,000.00~~ ~~Rs. 48,000.00~~
- width 750 mm
- length 91.5 M

- Air and gas fans

- type-centrifugal blower
- capacity-10800 NM<sup>3</sup>/hr. ... Rs. 107,000.00 10%

- pressure - 700 mm.wg.
- material - casing-MSRL Impeller SS 316
- operating temperature 60°C.
- Cranes and hoists Electric hoist
  - lifting capacity - 2 T. 80,000.00
  - length of bridge - 12 M. Rs. ~~40,050.00~~ 10%
- Boilers Total Rs. <sup>55</sup>~~38~~ lakhs
  - capacity - 20 TPH
  - fuel to be used-Fuel oil
  - pressure - 12 kg./cm<sup>2</sup>
- Lorries :
  - type - ordinary 250,000.00
  - loading capacity-12 Te. Rs. ~~200,000.00~~
- Fork lift trucks
  - type
  - lifting capacity
- Front end loaders 1,700,000.00
  - type - Tyre mounted Rs. ~~1,011,300.00~~ --
  - capacity - 153 m<sup>3</sup>
- Electric motors
  - power - 75 HP
  - voltage - 415 V
  - rotating speed-1500 rpm Rs. 60,000.00 Rs. 6,000.00
  - type - synchronous, TEFC squirrel cage
- Ball mills
  - diameter - 1.5 M 1,500,000.00 150,000.00
  - length - 2.4 M Rs. ~~1,018,000.00~~ Rs. ~~100,000.00~~
  - lining material-Rubber
  - electric motor- 75 HP



- ball charge - 5.5 Te.
  - Drum filters
    - filter area - 67.2 M<sup>2</sup>
    - filter cloth-polypropylene
    - material-Carbon steel
- Rs.22,50,000.00 ( total )

7.3 Electrification devices

- Transformers 5.....20 MVA: 5 MVA 110kv/11kv, \*\*TRANSFORMER  
Rs.750,000.00
- voltage
- Transformers 500...1500KVA:1000 KVA;11KV/433V, A\*TRANSFORMER  
Rs. ~~1,10,000.00~~  
1,600,000.00
- Voltage
- Cables ( 3 core )
  - cross section area 120 mm<sup>2</sup> Rs. 90 /m
  - insulation PVC (steelwire armoured)
- Cable racks Rs.10/kg 200 mm Rs 235/m  
100 mm Rs 110/m
- Instrumentation Cable Trays Material-Al./Anodized Al Rs.125/m. 500 mm Rs 670/m

7.4 Piping: cost of materials and erection, sizes specified

- |                           |           |        |
|---------------------------|-----------|--------|
|                           | Rs.       |        |
| - welded steel pipes      | 15/kg     | 24/kg  |
| - seamless steel pipes    | 18/kg     | 20/kg  |
| - Acid proof steel pipes  | 100/kg    | 200/kg |
| - Copper pipes            | 60/kg     |        |
| - Plastic pipes           | 25-300/kg |        |
| - Lead pipes              | 25/kg     | 40/kg  |
| - High pressure pipes     | 20/kg     |        |
| - Curves                  | 20/kg     |        |
| - Collars and flanges     | 25/kg     | 35/kg  |
| - T-pieces                | 20/kg     |        |
| - Valves                  |           |        |
| - Carbon steel, 15-250 NB |           |        |
| - Gate (Rs. 70-5000)      | 50,000    |        |
| - Globe (Rs.400-5000)     | 50,000    |        |

- Pipe bridges and fittings 15 12/ks

7.5 Erection and installation work

- Wages with social cost  
 - skilled labour 1,800 1000/month  
 - helpers 1,200 500/month

7.6 Taxes and duties of equipment, materials, erection etc.

- local suppliers <sup>12%</sup> excise duty; 4% S.T.  
 - foreign supplies <sup>40%</sup> customs duty of CIF prices  
 - Engg. commissioning etc. <sup>45</sup> 25%

8. LOCAL DATA FOR OPERATING COST ESTIMATE

8.1 Unit prices and availability of the following utilities and supplies at the industrial area:

	Cost-Rs.		Unit
<del>Fresh (potable) water</del>	<del>1</del>		<del>M<sup>3</sup></del>
<del>Cooling water</del>	<del>0.50</del>		<del>M<sup>3</sup></del>
Coal	200.00	250.00	Te
Fuel oil	2400.00	3,141.00	Te
Natural gas	-		-
<del>Electricity</del>	<del>0.65</del>		<del>kwh</del>
Propane (LPG)	3.25	5.64	kg.
Sulphuric Acid	900.00	1,500.00	Te
Lime	600.00		Te
Limestone	20 to 30		Te
HCl (30% Acid)	330.00		Te
NaOH (Solid-Rayon Grade)	6500.00		Te
Grinding balls for ball mill	10000.00		Te
Refractory bricks	8.00		brick
- chrome magnesite			
- shamotte		Not available in India	

8.2 Wages and salaries including social costs:

Managers	Rs. 2,500/-	Rs. 3,000/-
Operating Engineers } Foremen	2,000/-	2,500/-
Skilled labour	1,500/-	1,800/-
Unskilled labour	1,000/-	1,200/-

8.3 Daily, weekly and annual operating time of personnel.

Daily 8 hrs., Weekly 48 hrs. and annual 2400 hrs.

8.4 ~~Transportation costs of raw-materials, liquids and products:~~

~~Road freights Rs. 0.25 to 0.35/ton km.  
Railway freights Depends on material transported and gauge of rail-line.  
Harbour storing costs ) Works out to about 2 to  
Harbour stowing costs ) 3% of F.O.B. cost of  
Harbour duties ) equipment.~~

9. DATA FOR ESTIMATION OF REVENUES

Unit prices of products(ex-works) to be used in profitability calculations:

Iron calcine No valve  
 - Fe appr. 65%  
 - S " 0.5%  
 - Cu " 0.05%  
 - SiO<sub>2</sub> " 5%  
 Elemental sulphur(liquid) 2,323/-  
 Elemental sulphur (solid) Rs. 1,350/- for fertilizer use  
 and Rs. 1,500/- for non-fertilizer use.  
 2,573/-  
 So<sub>2</sub>-bearing process gases for manufacturing of sulphuric acid  
 So<sub>2</sub>-content appr. 7-9 vol.%  
 o<sub>2</sub>-content appr. 6-7 vol.%

10. DATA FOR PROFITABILITY CALCULATIONS

- 10.1 Tax legislation
- Depreciations - <sup>6.67</sup> 10% Straight Line Method
  - Area regulations of taxation - A tax holiday of 7 years may be considered for profitability evaluation.
  - Tax free reserve regulations -
  - percentages of income tax - 55% + 5% s.c.
  - purchase tax - 4%
  - Other taxes - exise duty 8%
- 10.2 Capital stock
- Amount - 50% of total invest.
  - Requirements and limitations of dividends -
- 10.3 Financing terms of investment cost.
- Grace period - <sup>two</sup> three years
  - interest - <sup>13.0</sup> 14.5% for long term loan and 17.5% for short term loan.
  - Pay back period - 10 years.
- 10.4 ~~Monetary units to be used and rate of exchange~~
- ~~Indian Rupees - 1 US \$ = Rs. 9.5~~

\*\*\*\*\*

TYPICAL ANALYSIS OF PYRITES

	<u>Percent</u>
Sulphide Sulphur(S)	... 36.04
Sulphate Sulphur(S)	... 1.41
Silica (SiO <sub>2</sub> )	... 15.28
Total Iron(Fe)	... 35.72
Alumina (Al <sub>2</sub> O <sub>3</sub> )	... 2.09
Calcium Oxide (CaO)	... Traces
Magnesium Oxide (MgO)	... Traces
Volatile matter @ 800°C in one hour	... 31.06
Arsenic (As)	... 50 Parts/Million

\*\*\*\*\*



2.2  
Raw materials

2.2.1  
Pyrite ore

Ssulphide	38.04 %	
Ssulphate %	1.41 %	
Fe	35.72 %	
As	<del>0.0005</del> %	0.005 ‰
C	1.0 %	
SiO <sub>2</sub>	15.28 %	
Al <sub>2</sub> O <sub>3</sub>	2.09 %	
Grain size	80 % - 74 um	
Moisture (wet basis)	8 %	

2.2.2  
Top shale

Ssulphide	9.2 %	
Ssulphate	1.6 %	
Fe	11.2 %	
C	2.6 %	
SiO <sub>2</sub>	50.4 %	
Al <sub>2</sub> O <sub>3</sub>	13.2 %	
Grain size	80 % - 74 um	
Moisture (wet basis)	8 %	

2.2.3  
Coal

C <sub>tot</sub>	62.5 %	
C <sub>fix</sub>	51.0 %	
Volatiles	20.0 %	
Moisture	4.0 %	
Ash	25.0 %	
Net heat of combustion		23 MJ/kg
Grain size	0-25 mm	
Analysis of ash:		
SiO <sub>2</sub>	40 %	
CaO	10 %	
Al <sub>2</sub> O <sub>3</sub>	20 %	
Fe <sub>2</sub> O <sub>3</sub>	20 %	



2.2.4  
Fuel oil

Bunker C	
C	85 %
H	11 %
S	3.5 %
N	0.1 %
O	0.4 %

Net heat of combustion 40.5 MJ/kg

2.2.5  
Slacked lime

Ca (OH) <sub>2</sub>	90 %
Balance	10 %

2.2.6  
Sulphuric acid

H <sub>2</sub> SO <sub>4</sub>	94 %
--------------------------------	------

2.2.7  
Catalyst mass

Al <sub>2</sub> O <sub>3</sub>	34 %
CaO	21 %
Fe	7 %
SiO <sub>2</sub>	3 %

2.2.8  
Lime stone

CaCO <sub>3</sub>	80 %
-------------------	------







3

PROCESS DESIGN

- 3.1 Process Description
  - 3.1.1 Flash Smelting Area
    - 3.1.1.1 Drying of Feed Material
    - 3.1.1.2 Flash Smelting
    - 3.1.1.3 Reduction and Process Gas Handling
  - 3.1.2 Sulphur Plant Area
    - 3.1.2.1 Sulphur Recovery
    - 3.1.2.2 Sulphur Washing
    - 3.1.2.3 Sulphur Prilling
  - 3.1.3 Additional Plant Areas
    - 3.1.3.1 Power Plant
    - 3.1.3.2 Coal Plant
    - 3.1.3.3 Oxygen Plant
    - 3.1.3.4 Water Treatment Plant
    - 3.1.3.5 Lime Stone Slurry Preparation Plant
    - 3.1.3.6 Compressed Air Station
- 3.2 Process Calculations
  - 3.2.1 Flash Smelting Area
  - 3.2.2 Sulphur Plant Area
- 3.3 Process Flow Sheets

Flash Smelter and Sulphur Plant Process Flow Sheet

360 100 901 002-1 Rev 3

Power Plant, Steam Flowsheet

360 100 901 010- 1 Rev 0



3  
PROCESS DESIGN

3.1  
Process Description

3.1.1  
Flash Smelting Area

3.1.1.1  
Drying of Feed Materials

The ground and predried pyrite ore is the starting material of the sulphur production. The grain size of the pyrite is 80 % - 74 um and moisture 8 %.

From the concentrate day bins the pyrite ore and top shale are fed through a screen to drying in steam heated dryers. In the steam dryers wet material is dried by hot steel tubes which are heated from inside by steam at 20 bar.

The moisture content of the dried material is less than 0.2 % and the temperature of the exhaust gas is about 100°C. The exhaust gas contains dust, which is separated in the bag filter. The dried material is pneumatically conveyed to the dried charge bin.

3.1.1.2  
Flash Smelting

The feed material mixture consists of pyrite ore and top shale. The top shale amount is regulated so that all the iron of the pyrite can be slagged. The process air is enriched with technical oxygen. With oxygen enrichment the temperature of the furnace is controlled and with the total oxygen amount the oxidation of sulphur and iron is controlled.

The feed mixture is fed through the roof of the reaction shaft by means of the concentrate burner. Inside the reaction shaft the well distributed pyrite and the top shale particles react with air and oxygen. The retention time for the suspension in the shaft is about 1-2 seconds, in which time the solids are heated up and smelted after many different chemical reactions. As a result of the reactions slag and sulphur containing gas are produced.

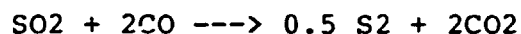
In the horizontal settler part slag is separated from gas. The slag is tapped and granulated with water. The produced gas mainly consists of sulphur dioxide, water, carbondioxide and nitrogen.



## 3.1.1.3

## Reduction and Process Gas Handling

After the reaction shaft the gas contains SO<sub>2</sub> and therefore reduction of the gas is carried out in the uptake shaft of the flash smelting furnace in order to produce elemental sulphur. The following main reactions take place in reduction:



At the same time the oxidic dust components are sulphidized.

In the rear end of the settler part coal dust is burned with oxygen enriched air to raise the temperature of the smelting gas for the reduction.

The reduction is performed by injecting coal dust (70 % - 74 um) against the gas flow.

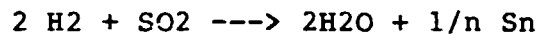
The maximum sulphur production is obtained when the gas after reduction contains a little less SO<sub>2</sub> than half of the sum (H<sub>2</sub>S + H<sub>2</sub> + CO + COS).

The reduction is endothermic and the temperature decreases. The temperature after the reduction is 1230 oC.

The reduced process gas together with molten dust is fed into the waste heat boiler, where cooling and solidifying of dust compounds take place. The boiler consists of a radiation chamber and convection section. The gas is cooled to 350oC by the boiler and saturated steam is produced at 70 bar. A minor part of the dust is separated in the boiler and the remaining dust in two electrostatic precipitators working parallel at a temperature of 360oC.

The dusts from the boiler and electrostatic precipitators are taken out through water seals and fed to a thickener.

When the gas is being cooled in the waste heat boiler, many reactions take place between gas components:



Also sulphur vapour  $\text{S}_2$  polymerizes to  $\text{S}_4$ ,  $\text{S}_6$  and  $\text{S}_8$ .

### 3.1.2

#### Sulphur Plant Area

#### 3.1.2.1

##### Sulphur Recovery

After the electrostatic precipitators the cleaned gas is led into the sulphur condensing boiler, where the gas is further cooled down to  $150^\circ\text{C}$  and at the same time the elemental sulphur is condensed. The first part of the boiler produces saturated steam at the pressure of 5.5 bar and the second part at the pressure of 1.7 bar.

Part of the condensed sulphur is taken from the bottom of the boiler and the rest is carried over by the gas. These sulphur drops are caught from the gas in the agglomerator and demister.

After the demister the gas is reheated to  $430^\circ\text{C}$  in the gas reheater by burning fuel oil with air.

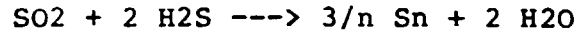
The reheated gas is led into the hot catalyzer where the following main reactions take place:



These reactions are exothermic and thus the process gas temperature increases to  $480^\circ\text{C}$ . A high alumina cement with  $\text{Al}_2\text{O}_3$  as active material is used as catalyst.

The major part of the gas is led after the hot catalyzer into the gas cooling boiler, which produces saturated steam at 5.5 bar. In the boiler, part of the sulphur is condensed. The minor part of the gas is passed by the boiler in order to control the temperature of the gas to  $250^\circ\text{C}$  before cold catalyzers.

The main reaction of the cold catalyzers is:



The reaction is slightly exothermic and increases the temperature of the gas to about 260°C. The same catalyst as in the hot catalyzer is used.

After the cold catalyzers the elemental sulphur is recovered from the gas in sulphur condensing towers. Liquid sulphur is sprayed in the towers, where it meets the process gas counter-currently cooling down the gas to 135°C and condensing sulphur from the gas.

The liquid and condensed sulphur flows from the sulphur condensing towers to the sulphur circulating tank and from there the sulphur is pumped through sulphur cooling boilers back to the sulphur condensing towers. In the sulphur cooling boilers the sulphur temperature drops from 133 °C to 123 °C. The boiler produces saturated steam at the pressure of 1.7 bar.

The recovered sulphur is pumped from the sulphur circulating tank to sulphur washing.

After the condensing towers there is a little sulphur in the gas as drops. These are caught in a demister.

Minor amounts of  $\text{H}_2\text{O}$  in the gas are converted mainly to  $\text{SO}_2$  by an incinerator, where oil is burned. The gas temperature after the incinerator is 400 °C.

Before directing into the stack the gas is still washed with a scrubber-absorption tower system, in scrubber by water and in absorption tower by lime stone slurry. Thus the  $\text{SO}_2$ -percentage of the gas is reduced to 0.05 % with no  $\text{H}_2\text{S}$ . Temperature of the exhaust gas is 60°.

#### 3.1.2.2 Sulphur Washing

The sulphur produced from the process gas contains arsenic as main impurity. The arsenic is removed from the sulphur in low pressure autoclaves, into which liquid sulphur and lime water suspension are pumped counter-currently. Lime reacts very selectively with arsenic in sulphur forming a water soluble calcium thioarsenate.

The waste liquid from the autoclaves is treated with sulphuric acid in a reactor in order to remove arsenic from the waste liquid. The arsenic precipitate formed is separated in a thickener and in a filter.



### 3.1.2.3 Sulphur Prilling

The liquid sulphur is fed to a sulphur tank, where the temperature of the sulphur is 125 oC. The sulphur is pumped to prilling nozzles of a prilling tower. The sulphur is sprayed through the nozzles, and air and water are blown to sulphur spray to cool sulphur drops and to slow down falling speed.

From the tower the prilled sulphur is fed to a screen and weighed.

### 3.1.3 Additional Plant Areas

#### 3.1.3.1 Power Plant

Waste heat from flash smelting furnace is recovered by a waste heat boiler which produces saturated high pressure steam of 70 bar.

Main part of the high pressure steam is superheated up to 300 oC in a separate, coal fired superheater. The superheated steam is then used for generation of electric power in a turboalternator. Part of the waste heat boiler steam is reduced to 20 bar and used in the steam dryers.

During shut downs of the smelter the minimum required steam production is ensured by an oil fired auxiliary boiler.

The turbine of the turboalternator is of condensing type. The steam flows through the turbine to a condenser, which operates with water cooling. The condensate is returned to the feed water tank.

The steam of 5.5 bar generated in sulphur condensing and gas cooling boilers of the sulphur plant is utilized mainly as heating agent in the feed water tank and in sulphur handling equipment.

The steam of 1.7 bar from sulphur condensing and liquid sulphur cooling boilers is utilized as heating agent for make up water.

The power consumption of the whole area will be about 17.5 MW by full load. The rated power of the turboalternator will be 25 MW.



The power generation exceeds the consumption of the plant, and the excess power can be transferred out of the plant area.

#### 3.1.3.2 Coal Plant

Pulverized coal is used in the flash smelting furnace to increase gas temperature before the uptake shaft and to reduce gases in the uptake. In the superheater boiler coal dust is used for firing.

Raw coal is charged through a feed funnel to belt conveyors and further to a raw coal bin. From the bin coal is fed to the grinding mill, ground to 70 % minus 200 mesh (0.074 mm) and dried by the warm gas flow, which is mainly preheated air. Pulverized coal is conveyed pneumatically to the dozing bins of flash smelting furnace area and to a storage bin for superheater burner coal. Further to burners it is again transferred pneumatically.

There are two milling units with feed bins in order to ensure continuous feeding of coal dust. Each mill is designed to grind and dry coal successfully at capacity to meet plant requirements.

#### 3.1.3.3 Oxygen Plant Area

The air separation plant produces oxygen to enrich the flash smelting furnace process air and combustion air and to burn open the furnace tap holes.

The plant operates according to the low-pressure process with double refrigeration. Drying of the air after cooling as well as simultaneous elimination of the carbon and sulphur dioxides is performed by means of molecular sieves.

The purity of produced oxygen is 95 %.

#### 3.1.3.4 Water Treatment Plant

The water treatment plant and cooling water circulation are included in offsite facilities.

Separate water types needed on the plant area are filtered raw water, demineralized water and semi-soft water.



3.1.3.5  
Lime Stone Slurry Preparation Plant

In the absorption tower the process gas is washed with limestone slurry.

The limestone is ground and screened before mixing with water. The  $\text{CaCO}_3$  - content of the limestone is 80 %.

3.1.3.6  
Compressed Air Station

At the compressed air station pressure air for the needs of the plant is produced in 7 bar abs. pressure.





3.2  
Process Calculations

The temperature of the air is supposed to be 40°C and its relative humidity 80 %.  
The oxygen percentage of the technical oxygen is 95 %.

Note: All gas volumes are at normal state i.e. 1 bar, 0°C.

Boiler pressure figures are absolute values.

3.2.1  
Flash Smelting Area

Steam Dryer

Pyrite ore (dry)	t/h	83.5
- moisture (wet basis)	%	8.0
Top shale (dry)	t/h	20.0
- moisture (wet basis)	%	8.0
Steam 20 bar, 210°C	t/h	18
Dryer exhaust gas	m <sup>3</sup> /h	24200
- temperature	°C	100

Flash Smelting Furnace

Pyrite	t/h	83.5
Top Shale	t/h	20.0
Air to reaction shaft	m <sup>3</sup> /h	65700
Oxygen to reaction shaft	m <sup>3</sup> /h	15150
- temperature	°C	40
- oxygen enrichment	%	35.2
Distribution and leakage air	m <sup>3</sup> /h	2000
Slag	t/h	67.2
Gas after smelting	m <sup>3</sup> /h	80100
- temperature	°C	1390
- analysis		
H <sub>2</sub> S	%	0.2
CO	%	0.0
CO	%	0.5
SO <sub>2</sub>	%	26.7
S <sub>2</sub>	%	1.4
H <sub>2</sub> O	%	4.5
CO <sub>2</sub>	%	2.7
N <sub>2</sub>	%	64.0



Coal to settler	t/h	3.2
Combustion air	m <sup>3</sup> /h	13700
Oxygen	m <sup>3</sup> /h	1800
- temperature	°C	40
- oxygen enrichment	%	30
Coal for reduction	t/h	17.6
Injection air	m <sup>3</sup> /h	2200
Flue dust	t/h	10.6
Gas after furnace	m <sup>3</sup> /h	115000
- temperature	°C	1230
- analysis		
H <sub>2</sub>	%	1.2
H <sub>2</sub> S	%	1.1
CO	%	5.6
COS	%	0.2
SO <sub>2</sub>	%	3.6
S <sub>2</sub>	%	7.6
H <sub>2</sub> O	%	9.3
CO <sub>2</sub>	%	16.3
N <sub>2</sub>	%	55.1

Waste heat boiler

Flue dust from boiler	t/h	2.1
Steam production	t/h	111
- pressure	bar	70
- feed water temperature	°C	150
Gas after boiler	m <sup>3</sup> /h	108700
- temperature	°C	350
- analysis		
H <sub>2</sub>	%	0.2
H <sub>2</sub> S	%	1.7
CO	%	2.1
COS	%	1.2
SO <sub>2</sub>	%	2.2
S <sub>2</sub> ...S <sub>8</sub>	%	2.9
H <sub>2</sub> O	%	10.5
CO <sub>2</sub>	%	20.2
N <sub>2</sub>	%	59.0



Electrostatic Precipitators

Flue dust from precipitators	t/h	8.5
Gas after precipitator	m <sup>3</sup> /h	112200
-temperature	°C	360
-analysis		
H <sub>2</sub>	%	0.2
H <sub>2</sub> S	%	1.5
CO	%	1.7
COS	%	1.3
SO <sub>2</sub>	%	2.3
S <sub>2</sub> , ..., S <sub>8</sub>	%	2.8
H <sub>2</sub> O	%	12.6
CO <sub>2</sub>	%	19.7
N <sub>2</sub>	%	57.9

3.2.2 Sulphur Plant Area

Sulphur condensing boiler and demister

Sulphur production	t/h	24.1
Steam production	t/h	16.5
- pressure	bar	5.5
- feed water temperature	°C	150
Steam production	t/h	7.3
- pressure	bar	1.7
- feed water temperature	°C	105
Gas after demister	m <sup>3</sup> /h	109100
- temperature	°C	150

Gas reheater

Oil	t/h	1.35
Combustion air	m <sup>3</sup> /h	15800
Gas after reheater	m <sup>3</sup> /h	126300
- temperature	°C	426

Hot catalyzer

Gas after catalyzer	m <sup>3</sup> /h	125500
- temperature	°C	480
- analysis		
H <sub>2</sub> S	%	1.85
CO	%	0.08
COS	%	0.10
SO <sub>2</sub>	%	1.17
S <sub>2</sub> , S <sub>4</sub> , S <sub>6</sub>	%	0.50
H <sub>2</sub> O	%	13.0
CO <sub>2</sub>	%	21.8
N <sub>2</sub>	%	61.5



Gas cooling boiler

Sulphur production	t/h	1.4
Steam production	t/h	22.7
- pressure	bar	5.5
- feed water temperature	°C	150

Gas after boiler	m <sup>3</sup> /h	125100
- temperature	°C	250

Cold catalyzers

Gas after catalyzers	m <sup>3</sup> /h	124800
- temperature	°C	259
- analysis		
H <sub>2</sub> S	%	0.52
CO	%	0.07
COS	%	0.08
SO <sub>2</sub>	%	0.52
S <sub>6</sub> , S <sub>8</sub>	%	0.44
H <sub>2</sub> O	%	14.4
CO <sub>2</sub>	%	22.0
N <sub>2</sub>	%	62.0

Sulphur condensing towers and demister

Sulphur production	t/h	4.9
Gas after demister	m <sup>3</sup> /h	127000
- temperature	°C	135
- analysis		
H <sub>2</sub> S	%	0.51
CO	%	0.07
COS	%	0.08
SO <sub>2</sub>	%	0.51
S <sub>8</sub>	%	0.01
H <sub>2</sub> O	%	14.3
CO <sub>2</sub>	%	21.6
O <sub>2</sub>	%	0.4
N <sub>2</sub>	%	62.5

Sulphur cooling boilers

Steam production	t/h	10.4
- pressure	bar	1.7
- feed water temperature	°C	105



Incinerator

Oil	t/h	1.2
Combustion air	m <sup>3</sup> /h	14000
Secondary air	m <sup>3</sup> /h	16200
Gas after incinerator	m <sup>3</sup> /h	158000
- temperature	°C	400
- analysis		
CO	%	0.13
SO <sub>2</sub>	%	1.23
H <sub>2</sub> O	%	13.9
CO <sub>2</sub>	%	18.5
O <sub>2</sub>	%	1.5
N <sub>2</sub>	%	64.7

Prescrubber and absorber

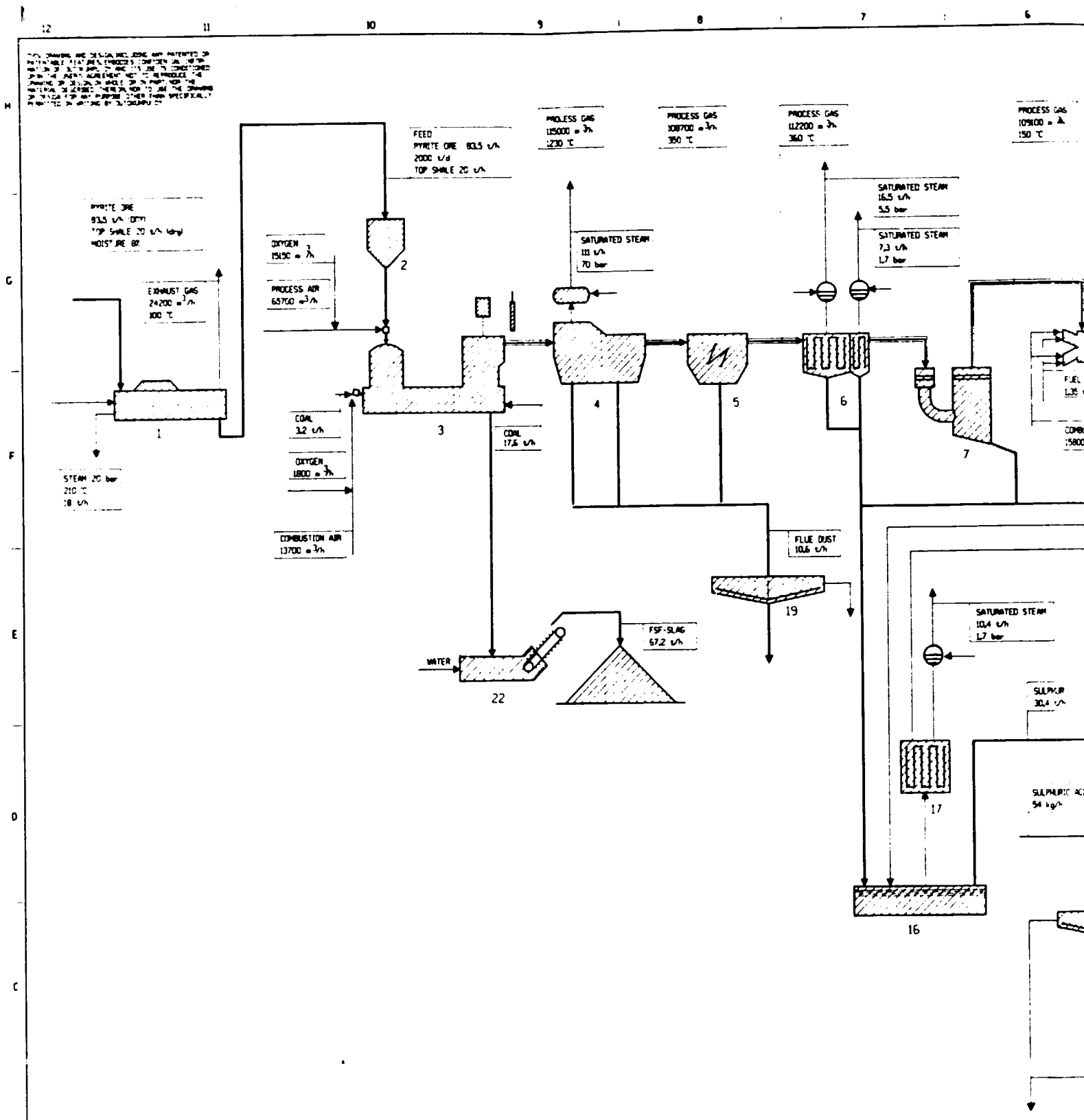
Prescrubber water	t/h	200
Limestone (80 % CaCO <sub>3</sub> )	t/h	12
Residue (dry)	t/h	16
Gas after absorber	m <sup>3</sup> /h	180000
- temperature	°C	60
- analysis		
CO	%	0.11
SO <sub>2</sub>	%	0.05
H <sub>2</sub> O	%	23.6
CO <sub>2</sub>	%	17.3
O <sub>2</sub>	%	1.3
N <sub>2</sub>	%	57.6



MATERIAL BALANCE OF THE FLASH SMELTING FURNACE

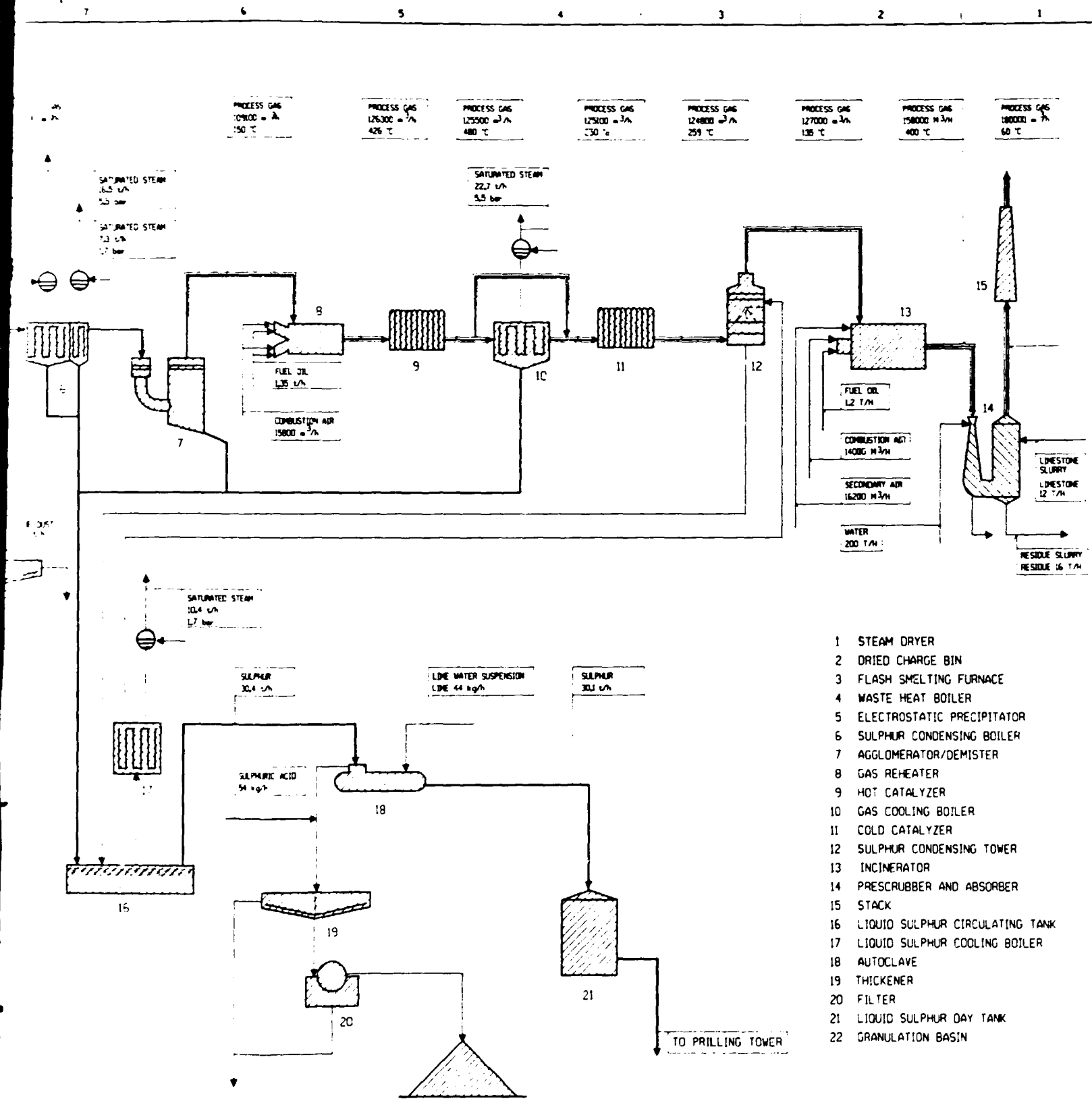
	Amount kg	%	S kg/h	%	Fe kg/h	%	SiO <sub>2</sub> kg/h	Al <sub>2</sub> O <sub>3</sub> kg/h	%	C kg/h
In:										
Pyrite	83500	39.5	32940	35.7	29830	15.3	12760	2.1 1740	1.0	830
Top Shale	20000	10.8	2160	11.2	2240	50.4	10080	13.2 2640	2.6	520
Coal	20760	0.5	100	3.6	750	10.4	2160	5.2 1080	64.8	13450
			35200		32820		25000	5460		14800
Out:										
Slag	67140	1.65	1105	45.4	30470	32.3	21700	6.2 4170		
Flue dust	10500	6.0	635	22.3	2350	31.2	3300	12.2 1290	10.8	1140
Furnace gas			33460							13660
			35200		32820		25000	5460		14800

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# SECTION 1

NO.	DATE	REVISIONS	BY	CHKD.	APP'D.
3		REVISED			
2		REVISED			
1		REVISED			
0		FOR INFORMATION			



PROCESS GAS 109100 m <sup>3</sup> /h 150 °C	PROCESS GAS 126300 m <sup>3</sup> /h 426 °C	PROCESS GAS 125500 m <sup>3</sup> /h 480 °C	PROCESS GAS 125100 m <sup>3</sup> /h 530 °C	PROCESS GAS 124800 m <sup>3</sup> /h 559 °C	PROCESS GAS 127000 m <sup>3</sup> /h 135 °C	PROCESS GAS 158000 m <sup>3</sup> /h 400 °C	PROCESS GAS 180000 m <sup>3</sup> /h 60 °C
---	---	---	---	---	---	---	--

- 1 STEAM DRYER
- 2 DRIED CHARGE BIN
- 3 FLASH SMELTING FURNACE
- 4 WASTE HEAT BOILER
- 5 ELECTROSTATIC PRECIPITATOR
- 6 SULPHUR CONDENSING BOILER
- 7 AGGLOMERATOR/DEMISTER
- 8 GAS REHEATER
- 9 HOT CATALYZER
- 10 GAS COOLING BOILER
- 11 COLD CATALYZER
- 12 SULPHUR CONDENSING TOWER
- 13 INCINERATOR
- 14 PRESCRUBBER AND ABSORBER
- 15 STACK
- 16 LIQUID SULPHUR CIRCULATING TANK
- 17 LIQUID SULPHUR COOLING BOILER
- 18 AUTOCLAVE
- 19 THICKENER
- 20 FILTER
- 21 LIQUID SULPHUR DAY TANK
- 22 GRANULATION BASIN

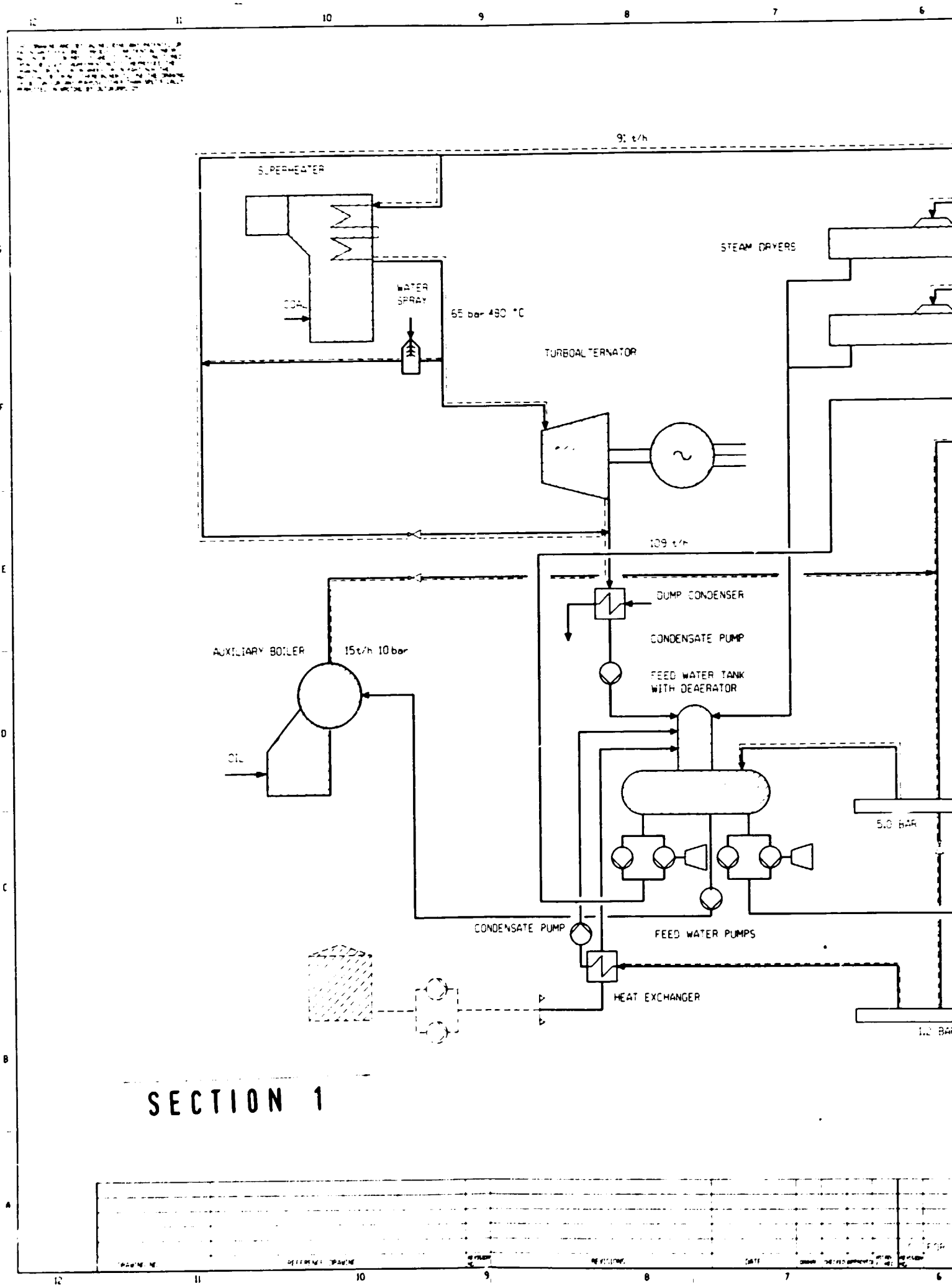
NOTE: ALL GAS VOLUMES AT NORMAL STATE (101,325 kPa @ 0°C)

## SECTION 2

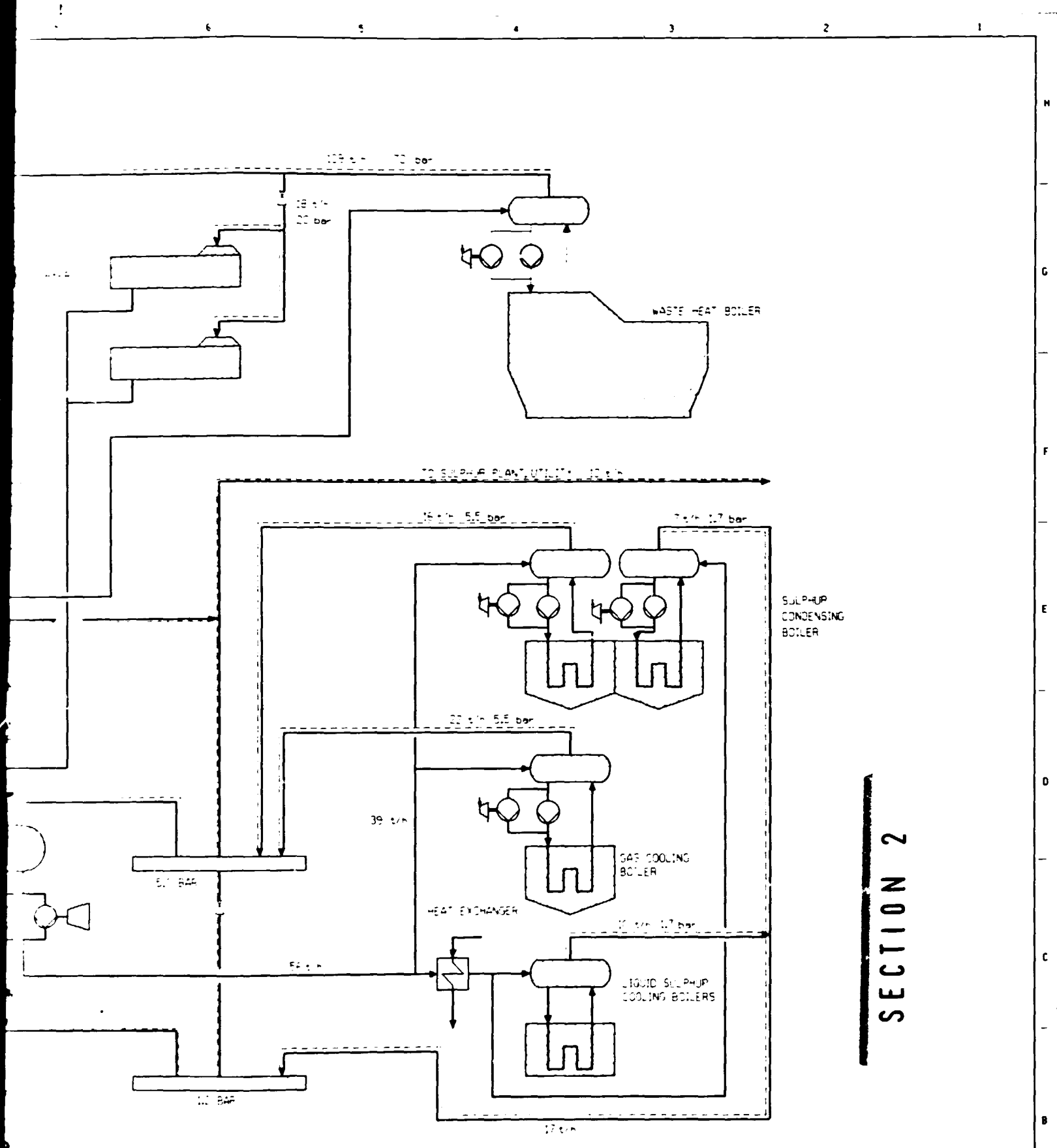
<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	DESIGNED	3 MAY -83	RJA
	CHECKED	12 MAY -83	RJA
	APPROVED	12 MAY -83	JRN
CLIENT	PYRITES, PHOSPHATES & CHEMICALS LTD		
PROJECT	PPCL PYRITE SMELTER		
DRAWING TITLE	FLASH SMELTER AND SULPHUR PLANT PROCESS FLOW SHEET	SCALE	REF. DWG.
		DWG. NO.	360.100.301.002.1
		REF. NO.	3

2	REVISED	11 JUN 1995	EKV RJA
2	REVISED	20 NOV 1984	JRN
1	REVISED	5 SEPT -84	JRN
0	FOR INFORMATION	5 MAY -83	MPA RJA/JRN





SECTION 1



SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	DESIGNED	27 FEB 1985	RJA
	CHECKED		
	APPROVED		
CLIENT	PYRITE, PHOSPHATES & CHEMICALS LTD.		DATE: 27 FEB 1985
PROJECT	PCL PYRITE SINTER		SCALE:
DRAWING TITLE	SULPHUR PLANT STEAM FLOW SHEET		SHEET NO. 360-100-901-01-10 REV. NO. 0





4		Page
PLANT DESIGN		
4.1	Plant Description	4-1
4.1.1	General	
4.1.2	Flash Smelter Area 200	
4.1.2.1	Dryer and FSF Area 210	
4.1.2.2	Flash Smelting Furnace Area 220	
4.1.2.3	Process Gas Handling Area 230	
4.2.1.4	Flue Dust Handling Area 240	
4.1.3	Sulphur Plant Area 300	
4.1.3.1	Sulphur Recovery Area 310	
4.1.3.2	Sulphur Handling Area 320	
4.1.3.3	Waste Liquid Handling Area 330	
4.1.4	Additional Plant Areas	
4.1.4.1	Coal Plant Area 500	
4.1.4.2	Power Plant 600	
4.1.4.3	Oxygen Plant 700	
4.1.4.4	Lime Stone Slurry Preparation Area 800	
4.1.4.5	Water Treatment Plant 900	
4.1.4.6	Compressed Air Station 950	
4.2	List of Equipment with Main Technical Data	4-7
4.2.1	Coding	
4.2.2	Equipment List	
4.3	Electrification	4-11
4.3.1	Description of Electrification	
4.3.2	Motor List	
4.4	Instrumentation	4-15
4.4.1	General Description of Instrumentation	
4.4.2	Preliminary Loop Number Schedule for Instrumentation	
4.5	Civil Works	4-24
4.5.1	Description of Buildings	
4.5.2	Building Material Quantities	
4.6	Water Supply	4-29
4.7	Sulphur Recovery Plant -228000 TPA (Outokumpu Process) Offsite Facilities Designed by Fact Engineering and Design Organisation, India	



4.8 Drawings

<u>Dwg Title</u>	<u>Dwg No.</u>	<u>Rev. No.</u>
Flash Smelter and Sulphur Plant Equipment Diagram	360 100 901 004-9	3
Coal Plant Equipment Diagram	360 100 901 008-1	1
Power Plant Equipment Diagram	360 100 901 009-1	1
Flash Smelter and Sulphur Plant Water Main Flow Diagram	360 100 901 012-1	0
Flash Smelter and Sulphur Plant Site Plan	360 100 902 004-9	2
Flash Smelter and Sulphur Plant Plot Plan	360 100 902 005-1	2
Flash Smelter Area Plant Layout, Plan	360 100 902 006-0	0
Flash Smelter Area Payout Layout Sections A-A and B-B	360 100 902 007-0	1
Sulphur Plant Area Plant Layout, Plan	360 100 902 008-0	1
Sulphur Plant Area Plant Layout Sections C-C, D-D and E-E	360 100 902 009-0	1
Coal Plant and Power Plant Plant Layout Plan and Section	360 100-902 010-0	1
Flash Smelter and Sulphurm Plant Instrumentation The Most Important Control Loops	360 FHS 0001-9	0



## 4 PLANT DESIGN

### 4.1 Plant Description

#### 4.1.1

General	Site Plan	Dwg No.	360	100	902	004-9	Rev.	2
	Plot Plan	Dwg No.	360	200	902	005-1	Rev.	2

The plant area is situated in Amjhore at the industrial area of PPCL, about half a kilometer south from the top of Hathini hill, alongside the proposed railway.

The sulphur smelter plant is a complete unit producing elemental sulphur from ground pyrite ore. The plant includes power station to generate the electric power the whole plant needs from steam that the process produces. Coal needed as well as boiler water are treated in their own handling plants on the plant area.

#### 4.1.2

##### Flash Smelter Area 200

Layout	Dwg No.	360	100	902	006-0	Rev.	0
Section	Dwg No.	360	100	902	007-0	Rev.	1

#### 4.1.2.1

##### Dryer and FSF Feed Area 210

Ground pyrite ore and top shale are transferred to concentrate day bins at the plant area by belt conveyors. The conveyors are not included in the plant scope.

From the day bins the materials are transported by belt feeders and conveyors through a screen to multicoil dryers. After drying in the dryers by steam heated tubes the material is lifted pneumatically to dried charge bin near the flash smelting furnace.

Exhaust gases from the drying plant are purified in a bag filter before blowing to the atmosphere.

#### 4.1.2.2

##### Flash Smelting Furnace Area 220

From the dried charge bin the materials are discharged by drag feeders and fed into the flash smelting furnace.

In the flash furnace - which is the heart of the sulphur production - pyrite smelts forming sulphur

containing gases and iron and silica rich slag.

In smelting process air and excess oxygen are blown into the reaction shaft.

Slag is tapped from the settler part of the furnace and granulated by water sprays. Granulated slag can be transported e.g. by front end loaders and lorries.

The furnace is protected inside by chrome magnesite and isolation brick lining.

The settler part of the furnace as well as tapping holes are cooled by copper cooling blocks connected to jacket water circulation. Reaction shaft is cooled by spray water flowing down on outer side of the shaft.

The furnace is equipped with emergency damper and stack to be used in cases that for some reason gases cannot be taken into the waste heat boiler and the furnace is still kept hot.

#### 4.1.2.3

##### Process Gas Handling Area 230

Smelting gases are reduced by coal injected into the lower part of the furnace uptake shaft.

From the smelting furnace uptake shaft gases are led to waste heat boiler, where the gases of about 1200°C are cooled to 350°C temperature. The boiler steam, 70 bar, is used for electric power production at power plant. Cooled gases are purified from flue dust by electrostatic precipitator (EP) which are installed two units parallelly.

Process gas fans blow the smelting gases to the sulphur recovery area.

For special purposes, e.g. for short preparation work in an electric precipitator or sulphur recovery area simultaneously that the waste heat boiler (WHB) or the other electrostatic precipitator is wanted to keep hot, gases are drafted out of the process by the bypass ejectors installed between WHB and EP and after each EP.

#### 4.1.2.4

##### Flue Dust Handling Area 240

Flue dusts separated in WHB and EP are mixed with water to form slurry, which is conducted by launders to thickener.



Underflow of the thickener is pumped to slag granulation rake classifiers and that way mixed to slag. The overflow water is used for slag granulation, flue dust slurry mixing and gas cleaning by a scrubber after sulphur recovery.

#### 4.1.3

##### Sulphur Plant Area 300

Layout	Dwg No. 360	100	902	008-0	Rev.1
Section	Dwg No. 360	100	902	009-0	Rev.1

#### 4.1.3.1

##### Sulphur Recovery Area 310

Gases blown to sulphur recovery area are first cooled down in a sulphur condensing boiler, where the temperature of gases reduces to 150°C. In the temperature conditions of the boiler elemental sulphur condenses. It is taken out from the boiler bottom. The boiler produces 5.5 bar steam in the front part and 1.7 bar steam in the rear part.

Part of the elemental sulphur in the gas continue as small drops to an agglomerator where the drops grow bigger. The drops are then separated from the gas in demister by gravity.

Gases from demister are now heated up to about 430°C by a gas reheater, where oil combustion gases are mixed to the process gas. The gas reheater has two burners. The reheater is protected by refractory lining. Heavy fuel oil (Bunker C) is used.

Heated gases flow to hot catalyzer unit where additional elemental sulphur forms in the gas mainly from SO<sub>2</sub>.

Gases are again cooled in a gas cooling boiler where sulphur condenses due to temperature decrease. Gases cool down to 250°C. The boiler generates 5.5 bar abs. steam. The boiler is furnished with a by-pass duct to allow better control of cold catalyzer temperature in special conditions.

Gases flow from cooling boiler to two parallel cold catalyzers, where additional elemental sulphur is formed.

Sulphur is again condensed in sulphur condensing towers by spraying cooled sulphur counter-currently into the gas stream.





Gases from the sulphur condensing towers are blown by two exhaust gas fans through a demister, where the rest of the sulphur drops in the gas are separated.

The minor amounts of  $H_2S$  the gas contains after the condensing towers are converted mainly to  $SO_2$  in an incinerator combusting heavy fuel oil. Gas temperature after the incinerator is  $400^\circ C$ .

Before blowing into the stack the gases are finally washed in a scrubber-absorption tower system by lime stone slurry to minimize sulphur effluents to the atmosphere.

#### 4.1.3.2 Sulphur Handling Area 320

Elemental sulphur condensed and separated from the gas stream is conducted via pump tanks to a bigger liquid circulating pump tank.

Sulphur separated in the front part of the sulphur recovery area, which contains small amounts of flue dust, is pumped onto a gravity filter before directing into the circulation pump tank.

From the circulation pump tank the sulphur is pumped to agglomerator/demister unit, via three sulphur cooling boilers to sulphur condensing towers, and to sulphur washing in two autoclaves (the produced sulphur).

In the autoclaves arsenic is washed off from the sulphur by lime stone slurry.

Purified sulphur is again filtered and pumped via measuring tanks to sulphur day tank and further to sulphur prilling tower.

In the prilling tower the liquid sulphur is granulated by spraying it as drops to fall down counter-currently to air stream in the tower.

Granulated sulphur is screened and conveyed to railway waggons by belt conveyors.

Liquid sulphur handling equipment are kept hot by 5.5 bar steam.

#### 4.1.3.3 Waste Liquid Handling Area 330

Waste liquid from autoclaves is treated in a reactor where sulphuric acid is added. The arsenic impurity is precipitated and separated from the liquid by a thickener vessel, underflow of which is vacuum filtered to form waste cake.



4.1.4  
Additional Plant Areas

4.1.4.1  
Coal Plant Area 500

Plan and Section Dwg No. 360 100 902 010-0 Rev. 1

Coal handling equipment is located beside the smelter and power plant, to the west of the power plant.

On the plant raw coal is first stored in bins, then milled, and stored as pulverized. For utilization in flash smelter furnace and steam superheater (at the power plant) the coal is transported pneumatically and injected into the furnaces.

4.1.4.2  
Power Plant 600

Plan and Section Dwg No. 360 100 902 010-0 Rev. 1

Separate power station is located beside the smelter area, north of it.

The power plant receives and handles separate steams generated in smelter plant boilers as follows.

- High pressure waste heat boiler steam 70 bar is superheated by coal and used to electric power generation.
- Medium pressure 5.5 bar steam is used for feed water heating in a common feed water tank, located at the power plant.
- Low pressure 1.7 bar steam from sulphur condensing and sulphur cooling boilers is used for heating the boiler feed water.

In power station an auxiliary boiler is installed, using oil as fuel. This boiler is used during shut-down cases to produce steam to keep smelter plant boilers and sulphur handling equipment hot and ready for start-up.

The power plant produces electric power, heating steam and boiler water to be utilized at smelter plant.

4.1.4.3  
Oxygen Plant 700

Oxygen for enriching the process air is produced in a separate plant, situated north from the other plant area, behind the main railway. Oxygen is conducted to the smelter plant in ducts as gaseous.



The plant is a complete unit comprising all equipment and accessories needed for pure oxygen 95 % production. Production capacity is 650 t/day.

4.1.4.4

Lime Stone Slurry Preparation Area 800 (IN OFFSITE FACILITIES)

Described in Chapter 4.7, Offsite Facilities Para 10, prepared by FEDO FACT, India.

4.1.4.5

Water Treatment Area 900 (IN OFFSITE FACILITIES)

Described in Chapter 4.7, Offsite Facilities, Para 3, prepared by FEDO FACT, India.

4.1.4.6

Compressed Air Station 950

Plant air is produced by two compressors. The capacity of each compressor is 35 Nm<sup>3</sup>/min. The outlet pressure is 7 bar abs.

Instrument air is produced by drying and filtering the plant air. The capacity<sub>3</sub> of the drying and filtering equipment is 7 Nm<sup>3</sup>/min.



4.2  
List of Equipment with Main Technical Data

4.2.1  
Coding

CODE	AREA
200	FLASH SMELTER AREA
210	DRYER AND FSF FEED AREA
220	FLASH SMELTER FURNACE AREA
230	FSF PROCESS GAS HANDLING AREA
240	FSF FLUE DUST HANDLING AREA
300	SULPHUR PLANT AREA
310	SULPHUR RECOVERING AREA
320	SULPHUR HANDLING AREA
330	WASTE LIQUID HANDLING AREA
500	COAL PLANT AREA
600	POWER PLANT AREA
700	OXYGEN PLANT AREA
800	LIME STONE SLURRY PREPARATION AREA
900	WATER TREATMENT AREA
950	COMPRESSED AIR STATION



<u>EQ. GROUP</u>	<u>EQ. TYPE</u>	<u>EQ. CODE</u>
Basins	Granulation basin	108
Bins	Day bin	116
	Dried charge bin	117
	Feed bin	117
	Storage bin	118
Boilers	Steam boiler	122
	Superheater	123
	Waste heat boiler	124
	Boilers, others	129
Burners	Coal dust burner	131
	Oil burner	133
	Concentrate burner	435
Casting eq.	Launder	140
Conveyors	Belt conveyor	167
	Drag conveyor	168
	Pneumatic conveyor	170
	Screw conveyor	172
	Scraper conveyor	174
	Conveyors, others	179
Dryers	Steam dryer	194
Ducts, gas and dust pipes	Hopper	202
	Stack	204
	Water lock	209
Fans	Fan	212
	Blower	214
Feeders	Air lock feeder	216
	Belt feeder	218
	Drag feeder	223
Filter	Drum filter	243
	Gravity filter	244
Furnaces	Flash smelting furnace	261
	Incinerator	263
Heat-transfer eq.	Feed water heating/cooling heat exchanger	280
	Gas reheater	281
	Heat exchanger, others	289



---

<u>EQ. GROUP</u>	<u>EQ. TYPE</u>	<u>EQ. CODE</u>
Lifting devices	Overhead travelling crane Crane	318
Mills	Mill	325
Pumps	Pump Dosage pump Ejector Slurry pump Vacuum pump Water pump	370 371 372 374 375 376
Screens	Vibrating screen	411
Separating eq.	Bag filter Cyclone Demister Electrostatic precipitator Scrubber	417 419 420 421 423
Special machines and equipment	Agglomerator Hot catalyzer Cold catalyzer Sulphur condensing tower Sulphur prilling tower	431 433 433 464 509
Tanks	Tank Autoclave Feed tank Measuring tank Mixing tank Pump tank Jacket and spray water tank Storage tank Reactor tank	510 511 514 515 516 518 519 519 521
Thickeners	Thickeners	532
Turbines	Steam turbine	556
Valves	Disc valve Emergency valve	562 569



4.2.2

Equipment List (In Volume II)

Smelter and Sulphur Plant

Equipment diagram,  
Dwg No. 360 100 901 004-9, Rev.3

Coal Plant

Equipment diagram,  
Dwg No. 360 100 901 008-1, Rev.1

Power Plant

Equipment diagram,  
Dwg No. 360 100 901 009-1, Rev.1



4.3

ELECTRIFICATION

4.3.1

Description of electrification

General principles

Principle of electric power distribution has shown in the main single line diagram. (Appendix 1)

Main transformer station

The main transformer station will be connected to the 110 kV line with open-wire circuit. The station comprises concrete foundations with fire walls of 110/11 kV main transformer and 110 kV switchyard incl. necessary compounds.

The rated power of the main transformer is 40 MVA.

Power plant

An electric room will be built in the power plant for a 11 kV main switchgear. The switchgear comprises 12 cubicles.

The power plant generator will be connected to the 11 kV main switchgear.

The rated power of the generator is about 25 MW.

11 kV auxiliary switchgears

There are three auxiliary switchgears. The switchgears will be located in following buildings:

Smelter  
Sulphur handling  
Oxygen plant

The energy will be fed from switchgears by cables to the distribution transformers and high voltage motors (  $\geq 350$  kW ).

The switchgears are to be placed in ventilated electric rooms.

440 V motor control centers

Motor control centers will be centralized in the electric rooms of each department. The energy will be fed from transformers to MCC's by means of busbars.





Transformers Following transformers will be required:

Flash smelting area	3	à	1600	kVA
Coal handling area	1	à	1600	"
Sulphur handling area (waste liquid handling)	2	à	1600	"
Sulphur recovery area	1	à	1600	"
Oxygen plant	2	à	1600	"
Power plant	1	à	1000	"
Off-site facilities	3	a'	1600	"
	13			pcs

The transformers will be placed in separate transformer rooms in the immediate vicinity of motor control centers.

Emergency power Emergency power needed in the plant will be generated by a diesel-generator. The emergency power unit will be located beside the smelter's electric room. The effect of emergency power unit has been chosen to about 600 kVA. Max. voltage after break-down is generated in 10-30 sec.

Control system The control of electric motors has been centralized to the control rooms of departments.

Lighting and welding outlets

Illumination shall provide necessary lighting for the process area. HP-Na lamps and fluorescent tubes will be used.

Light pillars and masts will be used for area lighting.

Welding outlets will be located in all necessary working areas.

Power demands Total installed power is estimated to be 23,4 MW. It can be divided into following parts:

Flash smelter area	4,5
Sulphur recovery area	1,4
Sulphur handling area	2,0
Oxygen plant	10,0
Coal handling area	1,4
Power plant	1,2
Off-site facilities	2,9
P <sub>inst.</sub>	23,4 MW



Normal running load

Running load at full capacity 17,5 MW

Cos  $\gamma$  = 0,8

Compensating

Compensating will partly be performed by capacitor banks and partly by power plant generator by which also the regulation of compensation is performed.

Engineering criteria of electrification

Voltages	Power supply	110 kV	3 ph	50 Hz
	Primary distribution	11 kV	3 ph	50 Hz
	Motors over 350 kW	11 kV	3 ph	50 Hz
	Motors 350 kW and below	440 V	3 ph	50 Hz
	Control (motors)	220 V	1 ph	50 Hz
	Control (HV-distrib.)	110 V	DC	

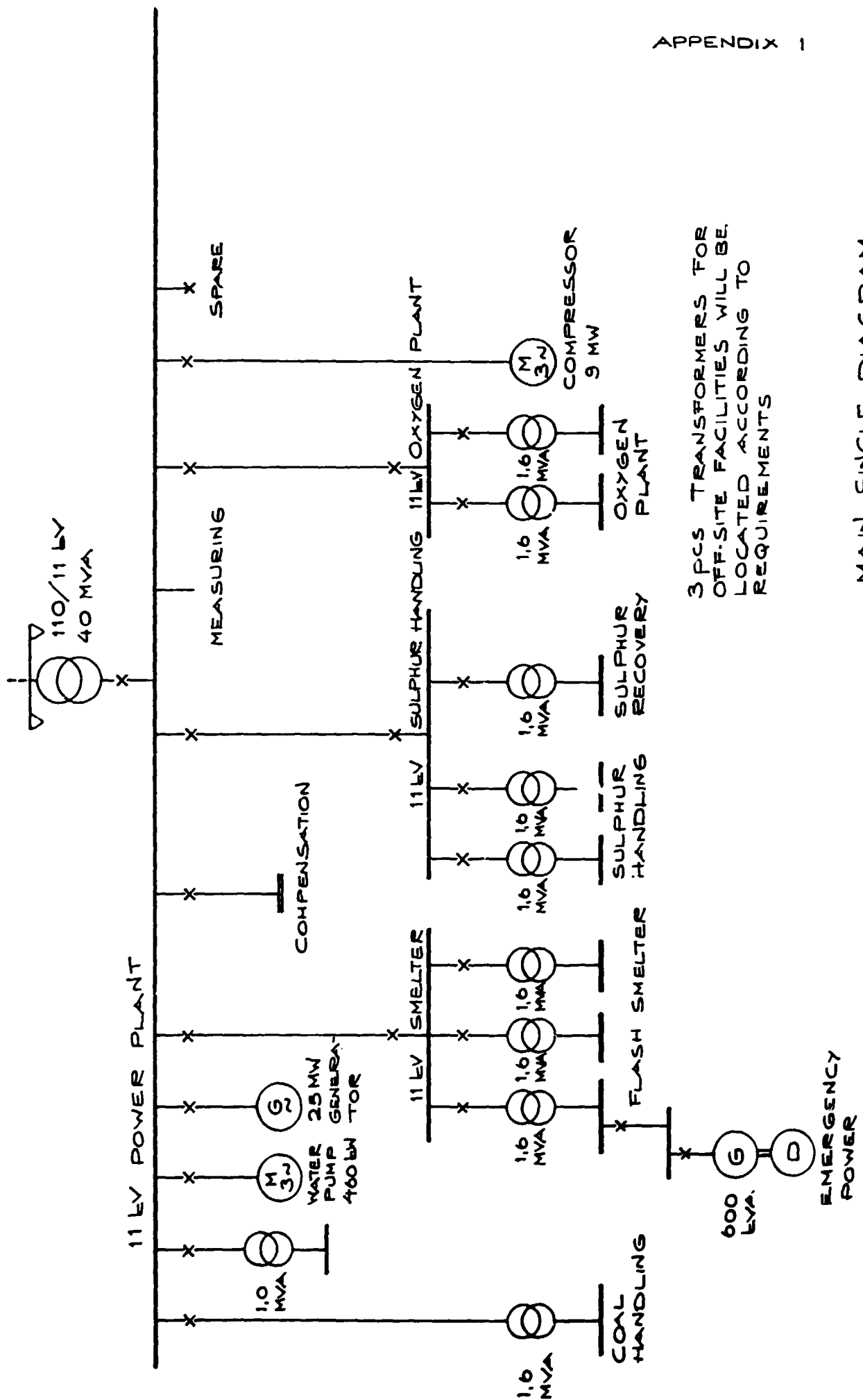
Short circuit capacities

110 kV	3500 MVA (max. allowed)
11 kV	500 MVA
440 V	38 kA, 1 s.

Energy consumption

(estimated operating time 7500 h/year)

Flash smelter	24 000 MWh/a
Sulphur plant	13 000 MWh/a
Power plant with coal handling	10 500 MWh/a
Oxygen plant	66 000 MWh/a
Off-site facilities	<u>17 250 MWh/a</u>
	130 750 MWh/a



3 PCS TRANSFORMERS FOR OFF-SITE FACILITIES WILL BE LOCATED ACCORDING TO REQUIREMENTS

MAIN SINGLE DIAGRAM



LIST OF MAIN ELECTRICAL EQUIPMENT

		SUPPLIER	
		<u>FOREIGN</u>	<u>LOCAL</u>
1	Main transformer 110/11 kV, 40 MVA		X
2	Power generator 25 MW, 11 kV	X	
3	11 kV switchgears, 4 pcs		X
4	Distribution transformers 1,6 and 1,0 MVA, 10 pcs		X
5	Motor control centers 440 V and relay panels		X
6	Emergency power diesel generator set	X	
7	Frequency converter drives	X	
8	Installation material, cables, cable trays, lighting, telecommunication equipment, grounding, power outlets, control boxes etc.		X



4.3.2  
Motor List

In Volume II



4.4  
INSTRUMENTATION

4.4.1  
General Description of Instrumentation

CONTENTS

- 1.0 Design Concepts
- 2.0 Control Rooms, Control Panels and  
Operator Work Stations
- 3.0 Field Mounted Instrumentation,  
Wiring and Piping
- 4.0 Power Supplies, Signals and  
Units of Measurements
- 5.0 Drawings and Data



1.0  
DESIGN CONCEPTS

1.01 The instrumentation and control system will be designed to provide information and control necessary to operate the plant efficiently, economically and safely with a minimum of personnel.

1.02 The controls shall be implemented using industry standard instruments and control systems. Use of custom designed or proprietary control systems shall be avoided to the extent possible.

1.03 Major instrumentation and controls shall be standardized in all plant areas of the project.

The following factors shall be given special consideration.

The number of operators required to operate the plant.

The availability and the location of vendor service and parts supply centers.

The amount of flexibility demanded by plant operations and optimum cost per unit of production for fuel, power, additives and labor.

The maximum recovery of a high purity product and controlled pollutant levels in plant effluents.

1.04 Electronic type instruments shall be generally used. Use of pneumatic instruments shall be avoided, except for control valves, certain local control loops, and special applications where the pneumatic instrumentation has a definitive advantage over the electrical instrumentation.

1.05 The control room instrumentation shall be based on a modern distributed digital control system (DCS). In addition a computer system for optimization, high level controls, data acquisition, reporting and process management shall be included in the project plan.

1.06 ISA symbols shall be used on preparing of Piping Instrumentation Diagrams (P & ID).

1.07 DIN standards and metric units shall be used on instrumentation design.



2.0

CONTROL ROOMS, CONTROL PANELS AND OPERATOR WORK STATIONS

- 2.01 A central control room (CCR) with control panels and operator work stations will be provided. The control room shall be the point of control for operating and/or monitoring the process and will contain the necessary instrumentation and controls to operate the process.
- 2.02 Colour TV-display units and Operator Work Station (OWS) with dynamic keyboard shall be used for DCS.
- 2.03 A free standing control panel with semigraphic diagram on the top part shall be provided for CCR. The vertical section of the panel shall include complementary analog instruments. The sloping console section shall include start-stop push buttons for motors, selector switches, ammeters etc.
- 2.04 There will also be a Relay Room (RR) near CCR for auxiliary equipment and electronic cabins of DCS.
- 2.05 The CCR and the Relay Room shall be pressurized with filtered air to exclude dust and noxious gases (SO<sub>2</sub> and H<sub>2</sub>S) and shall be air conditioned to maintain suitable constant temperature and humidity.
- 2.06 There will also be a control room for elementary sulphur plant. One sub OWS of DCS shall be located there. Certain operations of the sulphur plant will be controlled from this control room. A conventional control panel like that at CCR, shall be provided there, too.
- 2.07 The other plant of the area (Power Plant, Oxygen Plant and Coal Powder Plant) shall have their own control systems. However, the operations of these plants are depending on each other because their processes shall be connected together. That is why adequate information transmission between them shall be absolutely necessary. Information connections between the plants will be defined on Basic Engineering.





3.0

FIELD MOUNTED INSTRUMENTATION, WIRING AND PIPING

- 3.01 Field Mounted transmitters shall be two (2) wire type wherever possible. For certain special applications, where two (2) wire transmitters are not available, four (4) wire transmitters may be used.
- 3.02 Enclosures for field mounted instruments shall be DIN IP54 dust tight and water tight construction. Classification for hazardous application location, if required, shall be specified on the data sheets.
- 3.03 Instruments located outdoors and subject to severe ambient conditions including moisture, freezing and corrosion, shall be protected either by heating and/or shall be installed in weatherproof housing or shelters. The use of protective housing, or enclosures shall not inhibit the functioning of the instrument or detract from the ability to perform routine service.
- 3.04 All automatic control valves shall be provided with isolating block and bypass valves, unless duplication of equipment and lines allows control valve replacement without shutting down the process. Control valves which are not provided with isolating block valves and bypass shall be supplied with a manual handwheel or other means for hand operation.
- 3.05 Instrument signals and alarm wiring shall be designed with twisted pair cable with aluminum mylar electrostatic shielding, a bare copper drain wire and overall PVC jacket. The cable shall be suitable and approved for installation in cable trays.
- 3.06 Multipair cables shall generally be used to connect the field junction box to the control panel. The cable characteristics shall be same as above except each pair of conductors shall be individually shielded and have a bare copper drain wire.
- 3.07 The primary instrument connection shall be the responsibility of piping section. These connections will include process block valves, thermowell or probe couplings and flanges.
- 3.08 The instrument process piping material including tube, valves and fittings shall be 316 stainless steel.
- 3.09 The tubing runs for pneumatic transmission signals, and connections between filter-regulators and instruments, shall be made with 6 mm outside diameter 316 stainless steel tubing with 1.0 mm wall thickness.
- 3.10 Tube fittings for pneumatic system shall be 316 stainless steel compression type.



4.0  
POWER SUPPLIES, SIGNALS AND UNITS OF MEASUREMENT

4.01 The electrical supply for instruments will be 220 V, 50 Hz.

4.02 An uninterruptible power supply (UPS) providing 220 V/50 Hz shall be provided as the source of power to the Distributed Control System (DCS). The UPS shall provide a bumpless, fully synchronized 220 V/50 Hz power to DCS for a minimum period of 60 minutes in case of a power failure of primary source.

4.03 Supply of power to all instruments regardless of their location shall be design responsibility of instrument section. The supply of power to field instruments shall originate from the appropriate control panel. The instruments in the same loop shall be powered from the same source of power.

4.04 Pneumatic instruments shall operate from instrument air supply of 140 kPa gage pressure and shall yield a control signal over a range of 20 to 100 kPa gage pressure. Under special circumstances other signal ranges, and air supply pressures may be specified.

4.05 The piping section will supply a nominal 600 kPa gauge pressure dried and filtered instrument air supply source.

4.06 The main instrument air header design shall be the responsibility of the piping section and shall be shown on the area piping drawings.

4.07 The following transmission signal levels shall be used:

Analog Signals	- 4-20 mA DC
Alarm Signals	- 24 V DC
Counters	- 24 V DC
Solenoid Valves	- 220 V, 50 Hz
ON-OFF Controls	- 220 V, 50 Hz
Status Signals	- 220 V, 50 Hz
Interlocks	- 220 V, 50 Hz



4.08

The following SI metric engineering units shall be used on instrumentation:

- (a) Pressure
  - Kilopascal gauge pressure (kPa gauge)
  - Megapascal gauge pressure (MPa gauge)
- (b) Vacuum
  - Pascal Vacuum (Pa vacuum)
  - Kilopascal Vacuum (kPa vacuum)
- (c) Temperature - Degrees centigrade (C)
- (d) Level - 0-100 percent
- (e) Flow - 0-100 percent linear
- Water, volume - Liter per second (L/s)
- Process liquids volume - Liter per second (L/s)
- Process additives (liquids), volume - Liters per hour (L/h)
- Process additives (solids), mass - Metric tons per hour (tph)
- Process solids mass - Metric tons per hour (tph)
- (f) Angular speed
  - Revolutions per minute (rpm)
  - 0-100 percent
- (g) Linear velocity - Meter per second (m/s)
- (h) Density - Kilogram per cubic meter (kg/m<sup>3</sup>)
- (i) Electrical current
  - Ampere (A)
  - 0-150 Percent
- (k) Acidity, Alkalinity - pH Unit
- (l) Oxidation Reduction Potential - millivolts (orp mV)



5.0  
DRAWINGS AND DATA

5.01 A set of basic engineering drawings and data shall be prepared for major instrumentation and control systems. The drawings and data shall be sufficient to allow a qualified engineering company to perform detail engineering. The basic engineering drawings and data shall include the following:

- General Specification for Instrumentation Design
- Instrument Index
- Piping and Instrumentation Diagrams (P & ID)
- P & ID Symbols and Legends, Instrumentation
- Preliminary Instrument Data Sheets
- Control Panel Specifications
- Control Panel Layouts
- Preliminary lay-out for Central Control Room and Relay Room
- Space reservations for local control rooms and desks
- General specifications for Distributed Control System and Computer System
- Block Diagrams for DCS and Computer
- General specification for main control functions and operation
- General Specification for Instrumentation Installation

5.02 A complete set of detail engineering drawings and data shall be prepared for all instrumentation and control systems. The drawings and design data shall be detailed to allow a qualified contractor to submit bids for the procurement of installation material and completion of the work with a minimum of field engineering at the jobsite. The detail engineering drawings and data shall include the following:

- Updated Basic Engineering Drawings and Data
- Loop Diagrams
- Wiring Diagrams



- Cable Schedules
- Cable Tray Layouts
- Plot Plant of Field Instruments and Junction Boxes
- Installation Details and Bills of Material
- Drawings of Process Couplings and Tappings
- Vendors Drawings and Data for engineering, maintenance, construction and record purposes
- Drawings of Auxiliary Voltages Supply system
- Drawings of Installation Racks and Auxiliary Equipment Cabins



4.4.2

Preliminary Loop Number Schedule for Instrumentation

Instrument code letter identifications have been designated in accordance with the standard of Instrument Society of America. In addition following symbols have been used to define operation/location of the instruments:


/	Distributed Control System connection
0	A local instrument
θ	An analog instrument at Control room
X	An interlock or special service

A tag number of an instrument shall consist of five digit numbers. The first two digits represent the plant area in which the sensing or primary is located, followed by a three digit sequential number. The plant area numbers are:


00	GENERAL AREA, UTILITIES
01	MATERIAL DAY BINS AND FEEDING EQUIPMENT
02	DRYING AND DRYED CHARGE BINS
03	FLASH SMELTING FURNACE
04	GAS COOLING AND DEDUSTING
05	SULPHUR PLANT, GAS LINE
06	SULPHUR HANDLING EQUIPMENT


Attached are 16 sheets of Loop Number Schedules.




 <b>OUTOKUMPU OY</b> <b>ENGINEERING DIVISION</b> <b>ESPOO FINLAND</b>		Client	Project										Designed	Checked	Approved
<b>Drawing title</b> <b>INSTRUMENT LOOP NO SCHEDULE</b>		<b>Client</b> <b>PPCL</b> <b>INDIA</b>	<b>FLASH SMELTER &amp; SULPHUR PLANT</b>										Aug -84		
													Rev. No		
<b>Area</b> <b>01 CONCENTRATE DRY BINS, FLUX/CONC. MIXING</b>		<b>Drawing No.</b> <b>360 FHO 163 001</b>										<b>Instr. diagram No</b>			
<b>Function</b>		<b>Special</b> <b>SEV.</b>										<b>Notes</b>			
Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Special SEV.	Notes				
LAL-01101	CONCENTRATE BIN 1							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LAH-01102	CONCENTRATE BIN 1							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LSHH-01103	CONCENTRATE BIN 1								X		CONN. TO ELECTRIFICATION				
LAL-01104	CONCENTRATE BIN 2							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LAH-01105	CONCENTRATE BIN 2							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LSHH-01106	CONCENTRATE BIN 2								X		CONN. TO ELECTRIFICATION				
LAL-01107	CONCENTRATE BIN 3							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LAH-01108	CONCENTRATE BIN 3							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LSHH-01109	CONCENTRATE BIN 3								X		CONN. TO ELECTRIFICATION				
LAL-01110	FLUX BIN							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LAH-01111	FLUX BIN							/		X	TRAFFIC LIGHT FOR PAYLOADER				
LSHH-01112	FLUX BIN								X		CONN. TO ELECTRIFICATION				
FAL-01113	CONCENTRATE BELT FEEDER 1							/							
FAL-01114	CONCENTRATE BELT FEEDER 2							/							
FAL-01115	CONCENTRATE BELT FEEDER 3							/							
FICQ-01116	TOTAL CONCENTRATE FEED TO THE DRYER	/	⊖	/		/									
FFICQ-01117	CONCENTRATE / FLUX RATIO	/	⊖	/		/									
HC-01118	AIR JETS FOR BUILD-UP, CONC. BIN 1				/										
HC-01119	AIR JETS FOR BUILD UP, CONC. BIN 1				/										
HC-01120	AIR JETS FOR BUILD UP, CONC. BIN 2				/										
HC-01121	AIR JETS FOR BUILD UP, CONC. BIN 2				/										
HC-01122	AIR JETS FOR BUILD UP, CONC. BIN 3				/										
HC-01123	AIR JETS FOR BUILD UP, CONC. BIN 3				/										
HC-01124	AIR JETS FOR BUILD UP, FLUX BIN				/										
HC-01125	AIR JETS FOR BUILD UP, FLUX BIN				/										
SAL-01126	BELT CONV STOPPED							/							



 <b>OUTOKUMPU OY</b> ENGINEERING DIVISION ESPOO FINLAND		Client	Project								Designed	Checked	Approved
Drawing title <b>INSTRUMENT LOOP NO SCHEDULE</b>		Client <b>PPCL INDIA</b>	Project <b>FLASH SMELTER AND SULPHUR PLANT</b>								Designed Aug. - 84 SUN		
Area <b>72 DRYING AND DRYED CHARGE BINS</b>		Drawing No. <b>360 FHO 163 001</b>	Function								Rev. No		
										Instr. diagram No			
Loop No	Service											Notes	
FIQ - 02 101	STEAM CONSUMPTION OF THE DRYER 1			/	/								
FIQ - 02 102	STEAM CONSUMPTION OF THE DRYER 2			/	/								
PIC - 02 103	STEAM PRESSURE OF THE DRYER 1			/				/				SLAVE CONTR. OF TIC - 01105	
PIC - 02 104	STEAM PRESSURE OF THE DRYER 2			/				/				SLAVE CONTR. OF TIC - 01106	
TIC - 02 105	TEMP. OF CONCENTRATE AT OUTPUT D.1			/				/				SET-POINT TO PIC-02 103	
TIC - 02 106	TEMP. OF CONCENTRATE AT OUTPUT D.2			/				/				SET-POINT TO PIC-02 104	
LIC - 02 107	CONDENSATE COLLECTION VESSEL DR.1								○			LOCAL CONTROLLER	
LIC - 02 108	CONDENSATE COLLECTION VESSEL DR.2								○			LOCAL CONTROLLER	
LSH - 02 109	FEED FUNNEL OF THE DRYER 1									/	X	CONN. TO ELECTRIFICATION	
LSH - 02 110	FEED FUNNEL OF THE DRYER 2									/	X	CONN. TO ELECTRIFICATION	
PDAM - 02 111	PRESSURE DROP OF THE BAG FILTER									/			
WIA - 02 112	DRIED CHARGE BIN			/						/			
LSH - 02 113	DRIED CHARGE BIN										X	CONN. TO ELECTRIFICATION	
SICA - 02 114	DRAG CONVEYOR			/				/	/			SLAVE CONTR. OF WIC-02 117	
SICA - 02 115	DRAG CONVEYOR			/				/	/			SLAVE CONTR. OF WIC-02 117	
LSH - 02 116	DRIED CHARGE BIN										X	CONN. TO ELECTRIFICATION	
WICA - 02 117	DRIED CHARGE BIN			/				/	/			SET-POINT TO SK-02114, SIC-02115	
PIA - 02 118	PNEUMATIC CONVEYOR			/				/	/				

 <b>OUTOKUMPU OY</b> ENGINEERING DIVISION ESPOO FINLAND		Client	Project								Designed	Checked	Approved
Drawing title <b>INSTRUMENT LOOP NO SCHEDULE</b>		Drawing No. <b>360 FHO 163 001</b>	FLASH SHELTER AND SULPHUR PLANT								Aug 21 SDN		
Area <b>03 CHARGE FEEDING, AIR, OXYGEN</b>		Function		Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Rev. No	Instr. diagram No
Loop No	Service												Notes
FICG-03101	CHARGE FEED DRAG CONV. 220-223-100			/	⊕	/			/				
FICG-03102	CHARGE FEED DRAG CONV. 220-223-200			/	⊖	/			/				
SIA-03103	SPEED OF THE DRAG CONV. 220-223-100			/						/			
SIA-03104	SPEED OF THE DRAG CONV. 220-223-200			/						/			
FFIC-03105	CONCENTRATE/OXYGEN RATIO			/	⊖				/		X		
PI-03106	PRESSURE OF PROCESS AIR												P-CORRECTION FOR FLOW 119%
PSL-03107	PRESSURE OF PROCESS AIR										X		
TT-03108	TEMP. OF PROCESS AIR												T-CORRECTION FOR FLOW 11.
HC-03109	SHUT-OFF VALVE OF PROCESS AIR						/						
HC-03110	SHUT-OFF VALVE OF PROCESS AIR						/						
PIA-03111	PRESSURE OF PROCESS AIR			/						/			
AIR-03112	OXYGEN PERCENT OF PROCESS AIR			/	⊖								
FFIC-03113	OXYGEN ENRICHMENT PERCENT			/	⊖	/			/				
PT-03114	PRESSURE OF OXYGEN												P-CORRECTION FOR FLOW 11
TT-03115	TEMP. OF OXYGEN												T-CORRECTION FOR FLOW 11
PIA-03116	PRESSURE OF OXYGEN			/						/			
PSL-03117	PRESSURE OF OXYGEN										X		
HC-03118	SHUT-OFF VALVE OF OXYGEN						/						
PICA-03119	PRESSURE REDUCTION OF OXYGEN			/					/	/			
HC-03120	EMERGENCY SHUT-OFF VALVE OF OXYGEN						/						
PICA-03121	PRESSURE OF FLASH SMELTING FURNACE			/				/	/				MASTER CONTROLLE FOR PIC-04105
TI-03122	ARC TEMP. OF FLASH SMELTING FURNACE			/									
TI-03123	ARC TEMP. OF FLASH SMELTING FURNACE			/									
TI-03124	TAKE-UP SHAFT OF FSF			/									
TJR-03125	TAKE-UP SHAFT OF FSF				⊖								
PDIA-03126	PRESSURE DROP OF TAKE-UP SHAFT THROAT			/						/			

 OUTOKUMPU OY ENGINEERING DIVISION ESPOO FINLAND		Client	Project								Designed	Checked	Approved
Drawing title INSTRUMENT LOOP NO SCHEDULE		PPCL INDIA	FLASH SMELTER AND SULPHUR PLANT								Aug. - 84 SUN		
Area 03 COAL BURNERS OF SETLER		Drawing No. 360 FHO 163 001		Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Rev. No.	
		Function										Instr. diagram No.	
Loop No	Service											Notes	
FIC-03201	COAL RATE BURNER 1			/	/				/				
FIC-03202	COAL RATE BURNER 2			/	/				/				
FIC-03203	COAL RATE BURNER 3			/	/				/				
FIC-03204	COAL RATE BURNER 4			/	/				/				
FIC-03205	COAL RATE BURNER 5			/	/				/				
FIC-03206	COAL RATE BURNER 6			/	/				/				
FFIC-03207	COAL/OXYGEN RATIO BURNER 1			/					/				
FFIC-03208	COAL/OXYGEN RATIO BURNER 2			/					/				
FFIC-03209	COAL/OXYGEN RATIO BURNER 3			/					/				
FFIC-03210	COAL/OXYGEN RATIO BURNER 4			/					/				
FFIC-03211	COAL/OXYGEN RATIO BURNER 5			/					/				
FFIC-03212	COAL/OXYGEN RATIO BURNER 6			/					/				
PT-03213	PRESSURE OF COMBUSTION AIR											P-CORRECTION FOR FLOW M.	
TT-03214	COMBUSTION AIR											T-CORRECTION FOR FLOW M.	
FI-03215	CARRYING AIR FLOW BURNER 1			/									
FI-03216	CARRYING AIR FLOW BURNER 2			/									
FI-03217	CARRYING AIR FLOW BURNER 3			/									
FI-03218	CARRYING AIR FLOW BURNER 4			/									
FI-03219	CARRYING AIR FLOW BURNER 5			/									
FI-03220	CARRYING AIR FLOW BURNER 6			/									
PT-03221	CARRYING AIR PRESSURE											P-CORRECTION FOR FLOW	
TT-03222	CARRYING AIR TEMP.											T-CORRECTION FOR FLOW	
HC-03223	SHUT-OFF VALVE OF OXYGEN					/							
FIQ-03224	OXYGEN ENRICHMENT FOR SETLER BURNERS												
PIA-03225	OXYGEN PRESSURE			/					/				
PSL-03226	OXYGEN PRESSURE										X		
AIC-03227	OXYGEN ENRICHMENT PERCENT OF COMB. AIR			/				/					
HC-03228	SHUT-OFF VALVE OF COMBUSTION AIR					/							







OUTOKUMPU OY ENGINEERING DIVISION ESPOO FINLAND		Client PPCL INDIA	Project FLASH SMELTER AND SULPHUR PLANT								Designed Aug-84 SUAJ	Checked	Approved	
Drawing title INSTRUMENT LOOP NO SCHEDULE		Drawing No. 360 FHO 163 001		Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Rev. No	Instr. diagram No	
Area 04 WASTE HEAT BOILER EL. STATIC PRECIP.		Function										Notes		
Loop No	Service													
FIQ - 04101	STEAM FLOW			/		/								
FIQ - 04102	FEED WATER FLOW			/		/								
FIAS - 04103	CIRCULATION WATER			/						/	X			
LICA - 04104	DRUM LEVEL			/					/	/				
PICA - 04105	STEAM PRESSURE OF DRUM			/					/	/				
PDIA - 04106	PRESSURE DROP OF PROCESS GAS			/						/				
PICA - 04107	GAS PRESSURE INSIDE THE BOILER			/					/	/			SLAVE CONTR. OF PICA-03121	
HC - 04108	FEED WATER BY PASS VALVE						/							
HC - 04109	MAIN STEAM VALVE						/							
HC - 04110	START-UP STEAM VALVE						/							
PIA - 04111	FEED WATER PRESSURE			/						/				
TIA - 04112	FEED WATER TEMPERATURE			/						/				
LSL - 04113	DRUM LEVEL									/	X			
CIA - 04114	BOILER WATER CONDUCTIVITY			/						/				
FI - 04115	CONTINUOUS BLOW-OUT OF THE DRUM			/										
TI - 04116	GAS TEMP. OF RADIATION PART OF THE BOILER			/										
TIA - 04117	GAS TEMP. AT BOILER OUTLET			/						/				
TJR-03.125.2	GAS TEMP. AT BOILER OUTLET					⊖								
SAL - 04119	DRAG CONVEYOR OF FLUE DUST									/				
HC - 04120	DISC VALVE AT INLET OF EL. STATIC PRECIP.						/							
HC - 04121	DISC VALVE AT INLET OF EL. STATIC PRECIP.						/							
HC - 04122	BY-PASS EJECTOR						/							









 <b>OUTOKUMPU OY</b> ENGINEERING DIVISION ESPOO FINLAND		Client <b>PPCL</b> INDIA		Project <b>FLASH SMELTER AND          SULPHUR PLANT</b>								Designed	Checked	Approved			
												Aug.-84					
Drawing title <b>INSTRUMENT LOOP NO SCHEDULE</b>		Drawing No. <b>360 FHO 163 001</b>		Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Rev. No					
Area <b>04 PROCESS GAS FANS</b>		Function										Instr. diagram No					
Loop No	Service											Notes					
JIAH - 04301	POWER OF PROCESS GAS FAN			/						/							
NAH - 04302	VIBRATION									/							
TAH - 04303	WINDING OF MOTOR									/							
TAH - 04304	MOTOR & FAN BEARING									/							
SI - 04305	SPEED OF PROCESS GAS FAN			/													
JIAH - 04306	POWER OF PROCESS GAS FAN			/						/							
NAH - 04307	VIBRATION									/							
TAH - 04308	WINDING OF MOTOR									/							
TAH - 04309	MOTOR & FAN BEARING									/							
SI - 04310	SPEED OF PROCESS GAS FAN			/													
TJR - 03125.9	PROCESS GAS TEMP AT OUTLET OF THE FANS										⊖						

 <b>OUTOKUMPU OY ENGINEERING DIVISION ESPOO FINLAND</b>		Client	Project							Designed	Checked	Approved				
<b>INSTRUMENT LOOP NO SCHEDULE</b>		<b>PPCL INDIA</b>	<b>FLASH SMELTER AND SULPHUR PLANT</b>							Aug-84 SUN						
Drawing title		Drawing No.		Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Rev. No				
Area		Function										Instr. diagram No				
Loop No	Service															
PI - 05101	PROCESS GAS AT INLET OF SULPHUR CONDENSING BOILER			/												
TI - 05102	"			/												
TJR - 05103	"				⊖											
FI - 05104	FEED WATER FOR 5.5 BAR BOILER			/												
FIQ - 05105	STEAM OF 5.5 BAR BOILER			/		/										
FIA - 05106	CIRCULATION WATER OF 5.5 BAR BOILER			/						/	/	X				
LICA - 05107	DRUM LEVEL OF 5.5 BAR BOILER			/					/	/						
PIC - 05108	STEAM PRESSURE OF 5.5 BAR BOILER			/					/							
FI - 05109	FEED WATER FOR 1.7 BAR BOILER			/												
FIQ - 05110	STEAM OF 1.7 BAR BOILER			/		/										
FIA - 05111	CIRCULATION WATER OF 1.7 BAR BOILER			/						/	/	X				
LICA - 05112	DRUM LEVEL OF 1.7 BAR BOILER			/					/	/						
PIC - 05113	STEAM PRESSURE OF 1.7 BAR BOILER			/					/							
PI - 05114	PROCESS GAS PRESSURE AT OUTLET OF THE BOILER			/												
TI - 05115	TEMP. AT OUTLET OF SULPHUR COND. BOILER			/												
TJR - 05.1032	"				⊖											
PI - 05.116	PROCESS GAS PRESS. AT OUTLET OF AGGLOMERATOR			/												
TI - 05.117	PROCESS GAS AT OUTLET OF DEMISTER-AGGLOMERATOR			/												
PI - 05.118	"			/												
TJR - 05.1033	"				⊖											
HC - 05.119	BY-PASS VALVE OF DEMISTER-AGGLOMERATOR						/									
AICR - 05.120	PROCESS GAS CHROMATOGRAPH FOR SO <sub>2</sub> , H <sub>2</sub> S, COS			/	⊖		/									MASTER CONTR. FOR COAL INJECTION
PI - 05.121	PROCESS GAS PRESS AT OUTLET OF GAS FAN			/												
TI - 05.122	PROCESS GAS TEMP AT INLET OF GAS REHEATER			/												
TJR - 05.1034	"				⊖											
TIC - 05.123	PROCESS GAS TEMP. AT OUTPUT OF GAS REHEATER			/			/		/	/	X					MASTER CONTR. OF FUEL AT INJECTION
TJR - 05.1035	"				⊖											
PIA - 05.124	PROCESS GAS PRESS. AT INLET OF HOT CATALYZER			/						/						



 <b>OUTOKUMPU OY</b> ENGINEERING DIVISION ESPOO FINLAND		Client	Project							Designed	Checked	Approved
Drawing title <b>INSTRUMENT LOOP NO SCHEDULE</b>		Drawing No. <b>360 FHO 163 001</b>	<b>FLASH SMELTER AND                  SULPHUR PLANT</b>							Aug.-84 SUN		
Area <b>05 SULPHUR PLANT, GAS LINE</b>		Function	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Rev. No	
Loop No	Service										Instr. diagram No	
											Notes	
PIC - 05148	PROCESS GAS PRESS. AT OUTLET OF COND. TOWER 2		/				/				MASTER CONTR. OF SIC-05115	
TIA - 05149	PROCESS GAS TEMP. AT OUTLET OF COND. TOWER 2		/					/				
TJR - 0510311	"			⊖								
PI - 05150	PROCESS GAS PRESS. AT OUTLET OF EX. GAS FAN		/									
TI - 05151	PROCESS GAS TEMP. AT OUTLET OF EX. GAS FAN		/									
PI - 05152	PROCESS GAS PRESS. AT OUTLET OF DEMISTER		/									
TI - 05153	PROCESS GAS TEMP. AT OUTLET OF DEMISTER		/									
TJR - 05103.12	"			⊖								
AIR - 05154	PROCESS GAS KIDMATOGRAPH FOR SO <sub>2</sub> , H <sub>2</sub> S, COS		/	⊖				/				
IDIA - 05155	PRESSURE DROP OF VENTURI SCRUBBER		/					/				
TIA - 05156	EX. GAS TEMP. AT OUTLET OF VENTURI SCRUBBER		/					/				
IDIA - 05157	PRESSURE DROP OF ABSORBTION TOWER		/					/				
TIA - 05158	TEMP. OF EX GAS AT OUTLET OF ABS. TOWER		/					/				
FIA - 05159	COOLING WATER OF VENTURI SCRUBBER		/					/				
PIA - 05160	"		/					/				
FIA - 05161	CIRCULATION FLOW OF LIME MILK		/					/				
PIA - 05162	PRESSURE OF CIRC. LIME MILK		/					/				
IC - 05163	PUMP TANK OF CIRC. LIME MILK		/				/					
LAH - 05164	COOLING WATER LEVEL OF VENTURI SCRUBBER							/				
LAH - 05165	LIME MILK LEVEL OF ABSORBTION TOWER							/				
JIA - 05166	POWER OF EX. GAS FAN 1		/					/				
NAH - 05167	VIBRATION OF EX. GAS FAN 1							/				
TAH - 05168	WINDING OF EX GAS FAN MOTOR							/				
TAH - 05169	MOTOR & FAN BEARING OF EX. GAS FAN							/				
SIC - 05170	SPEED OF THE FAN		/				/				SLAVE CONTR. OF PIC-05146	
JIA - 05171	POWER OF EX GAS FAN 2		/					/				
NA - 05172	VIBRATION OF EX. GAS FAN 2							/				
TAH - 05173	WINDING OF EX GAS FAN MOTOR							/				



 <b>OUTOKUMPU OY</b> ENGINEERING DIVISION ESPOO FINLAND		Client	Project										Designed	Checked	Approved
Drawing title <b>INSTRUMENT LOOP NO SCHEDULE</b>		Client PPCL INDIA	Project FLASH SMELTER AND SULPHUR PLANT										Designed Aug-84 SUN		
													Drawing No. 360 FHO 163 001	Rev. No.	
Area <b>06</b> SULPHUR HANDLING		Function										Instr. diagram No			
Loop No	Service	Indication	Recording	Integration	Hand control	Set-point	Control	Alarm	Interlocking			Notes			
FI - 06101	FEED WATER FOR SULPHUR COOLING BOILERS	/													
FIQ - 06102	STEAM OF SULPHUR COOLING BOILERS	/		/											
LIC - 06103	DRUM LEVEL OF BOILER 1	/					/								
LIC - 06104	DRUM LEVEL OF BOILER 2	/					/								
LIC - 06105	DRUM LEVEL OF BOILER 3	/					/								
PIC - 06106	STEAM PRESSURE OF SULPHUR COOL. BOILERS	/					/								
LIC - 06107	LEVEL OF SULPHUR PUMP TANK 320-518-0200	/					/	/							
LIC - 06108	LEVEL OF SULPHUR PUMP TANK 320-518-0300	/					/	/							
LIC - 06109	LEVEL OF SULPHUR CIRCULATION TANK	/					/	/							
LIA - 06110	LEVEL OF SULPHUR TANK 320-519-0100	/						/							
LIC - 06111	LEVEL OF SULPHUR PUMP TANK 320-518-500	/					/								
TJR - 06112.1.2	TEMPERATURES OF MOLTEN SULPHUR														
LCA - 06113	CHARGING / DISCHARGING OF SULPHUR HEAT TANKS			/				0						LOCAL CONTROL LOGIC	
LIC - 06114	LEVEL OF PUMP TANK 320-518-0600	/					/								
LIA - 06115	SULPHUR DRY TANK 320-519-0200	/						/							
TIA - 06116	" " " " " " " "	/						/							
LIC - 06117	LEVEL OF PUMP TANK 320-518-0700	/					/								
FIQ - 06118	ELEMENTARY SULPHUR PRODUCTION	/		/											
WIQ - 06119	WEIGHING BRIDGE FOR VEHICLES	/		/											
LA - 06120	LIME BIN							/							
LA - 06121	MIXING TANK							/							
LIA - 06122	SULPHURIC ACID TANK	/						/							
FIQ - 06123	SULPHURIC ACID CONSUMPTION	/		/											
AIC - 06124	PH CONTROL AT REACTOR TANK	/					/	/							
LIC - 06125	LEVEL OF UNDERFLOW PUMP TANK	/					/	/							
LIC - 06126	LEVEL OF OVERFLOW PUMP TANK	/					/	/							



4.5  
Civil Works

4.5.1  
Description of Buildings

Buildings on the plant

1. Office and control building, electrical rooms included

- size L x B x H is  $19 \times 18 \times 15$  m  
i.e. about  $5500 \text{ m}^3$
- number of floors 3
- material of floors is concrete
- outer and inner walls of bricks
- mechanically ventilated

2. Smelter building

- size L x B x H is  $35 \times 24 \times 38$  m i.e. about  $32\,800 \text{ m}^3$
- steel construction with steel or asbestos roofing
- flash smelter furnace foundation as well as tapping floor are of concrete, other floors of steel structure.

3. Power plant

- size L x B x H is  $36 \times 25 \times 18$  m  
i.e. about  $16\,200 \text{ m}^3$
- main part of the building is the steel framed and steel or asbestos plate roofed turbine generator aisle.

The floor is on the ground level made of concrete, as turbine generator foundations, too.  
Necessary steel gratings and supports are included.

- the auxiliary part (about  $2600 \text{ m}^3$  of total) consists of control and electrical rooms and offices.  
The walls of this part are built of bricks, floors are made of concrete.

4. Compressed air station (compressor room)

- size is about L x B x H =  $12 \times 10 \times 6$  m  
i.e.  $720 \text{ m}^3$
- constructed of bricks for better noise absorption
- concrete floor on the ground



5. Oxygen plant

- area reservation for the plant is 40 x 30 m, concrete floored
- the main part of process equipment is unprotected, only some critical items such as the compressor with motor are protected.
- the office part on one side, approx. 1000 m<sup>3</sup>, is built of bricks. It includes control room, offices and other necessary covered rooms.
- the total building volume of the oxygen plant is approx. 2500 m<sup>3</sup>

6. Demineralized water plant

- size B x L x H is 7 x 20 x 8 m i.e. 1120 m<sup>3</sup>
- steel frame construction with asbestos roofing

7. Lime stone slurry preparation plant

- size L x B x H is 15 x 15 x 8 m i.e. about 1800 m<sup>3</sup>
- steel frame construction with asbestos roofing

8. Lime storage

- size appr. 5 x 5 x 5 m i.e. 125 m<sup>3</sup>
- steel frame construction with asbestos roofing

9. Power receiving station

Electrical equipment is located in the power plant house or unprotected on field.

10. Other

In addition, rainroofs are built e.g. above concentrate and top shale day bins as well as coal mills.

Pipe racks are covered, too.

Excavation

The ground on plant site will be levelled to the ground floor level of buildings before starting building works.





Foundations

Foundations will be made of concrete by casting on site. Machine and equipment foundations will be built separate from building frame foundations.

Big equipment foundations include roughly the following items:

- Concentrate and top shale day bins, multicoil steam dryers, flash smelting furnace, waste heat boiler, electrostatic precipitators, slag granulation basins and dust slurry thickener on flash smelter area
- Sulphur condensing, gas cooling boilers, hot and cold catalyzers, agglomerator/demister unit, sulphur condensing towers, incinerator, absorption tower, sulphur day tank and sulphur cooling tower on sulphur plant area
- Raw coal and pulverized dried coal bins and mills on coal plant area
- Superheater, turboalternator and auxiliary boiler in power plant
- Compressor with drive in oxygen plant
- Compressors with drives in compressed air station



### Frame structures

The building frames are of steel consisting of supporting columns, beams and purlin structures on which the roofings will be fixed.

Steel supporting structures of machines and equipment are connected to the building or are independent steel structures.

The frame structures will be prefabricated in so big parts as possible for transportation and treatment. Frame columns will be erected onto foundations with cast anchor bolts.

Steel intermediate platforms, service platforms, stairs, equipment foundations, etc. will be erected before or after machine installations as necessary.

Generally approved tolerance requirements and instructions will be followed in manufacture and installation. Connections to be made on work site are mainly bolted connections; only truss diagonals and other steel parts which must be exactly installed will be fixed on site by welding.

All steel structures will be sand-blasted for rust removal and after that painted in accordance with a program to be prepared separately. Only the necessary finishing will be performed on installation site. All steel structures to be made on site will also be painted.

### Walls

External walls will be of plastic coated, corrugated steel sheet or asbestos sheet fixed onto steel wall purlins with screws. The walls of offices can also be made of bricks.

The lower part of walls in the flash smelter building can be open.

Partition walls will mainly be of bricks.

### Roof slabs

Roofs will be of plastic coated corrugated steel sheet which is fixed onto steel roof purlins with screws. Roofs in office and storage buildings can also be made of double corrugated asbestos cement sheet fixed onto purlins.

Rain water will be led from rain water gutters on eaves into rain water drains on the ground inside or outside the building.



Platforms

Part of platforms, like tapping platform of flash smelter, floors of control room, electric and office rooms will be of reinforced concrete platforms built on steel beams.

Other platforms will be of steel grating or steel plate built on steel frame.

Stairs

Stairs will be steel framed. Steps of hot-dipped galvanized steel grating. Railings of painted steel pipes. Small outer stairs can also be made of reinforced concrete.

Windows

Outer windows in plant buildings will mainly be of colourless, plastic sheet, made according to the profile of wall corrugated sheet. Inner windows of polished plate glass. Office areas will be provided with double glass windows.

Doors

Outer doors in buildings and inner doors in plant and electric rooms will be manual steel doors. Inner doors in office rooms are wooden flush panel doors.

Floors

The floors resting on the ground will be made of concrete on a compact gravel layer. The surfaces will be finished in connection with the casting considering floor slopes.

The floors in offices and control room will be covered with asbestos vinyl tiles, and the floors in toilets with ceramic tiles. The floors in electric rooms will be painted.

Plasterworks and other finishings

The bottom of flash furnace overflow pond under the furnace and part of smelter tapping platforms will be covered with refractory bricks.

The walls in offices, wash rooms, control and electric rooms will be painted; wash rooms, etc. can also be covered with tiles. Other walls will generally be untreated.



Ventilation

Natural ventilation will be used as general ventilation in the plant buildings. Compensation air will be taken through louvres provided with blocking device installed in walls, or the lower part of walls will be open (smelter building). The exhaust will be made by means of exhaust units on the roof. These exhaust units will be provided with wind protection and rain shelter.

The office and control room building will be provided with mechanical ventilation. These areas will be kept in over-pressure compared to surrounding areas. Electric rooms will also be provided with mechanical ventilation and will be kept in over-pressure. Inlet air will be filtered.

Out-door tanks

The cooling water pump tanks will be made of water tight concrete.



4.5.2  
Quantities of Concrete, Structural Steel,  
Coatings, Maintenance Platforms, etc.

In the following material quantities needed in plant erection are estimated.

The equipment areas and buildings the estimation covers are as follows:

- all the process plant area including drying plant, flash smelter, sulphur recovery and handling areas as well as gas purifying area
- office and control building
- oxygen plant
- power plant
- compressed air station
- belt conveyors
- pipe racks

The following concrete equipment is not included, because it is concerned process equipment and included in the equipment list:

- concentrate and top shale day bins
- thickener, dia 30 m
- water tanks
- sulphur prilling tower
- slag granulation basins
- main stack

Material amounts needed

-	concrete	6 900 m3
-	structural steel	1 500 t
-	building coatings	8 500 m2
-	brick walls	2 900 m2
-	excavation	9 600 m3
-	filling	7 700 m3
-	maintenance platforms	3 600 m2
-	steel stairs	700 m



4.6  
WATER SUPPLY

Water supply to the plant is described in Chapter 4.7, Offsite Facilities, Paras 2 to 5, by FEDO FACT, and in the attached Water Main Flow Diagram No. 360 100 901 012-1.

Main flows and services are as follows (flow numbers refer to the diagram):

<u>Flow no</u>	<u>Description</u>
1.	Filtered raw water from the river Sone at 2 km distance.
2.	Filtered raw water from the surface water tank to different handling plants and consumption points.
3.	Semi-soft water, i.e. ion exchanged and partially chemically treated water, to cooling circulation water system as make-up water.
4.	Cooling circulation water (secondary cooling) to be used for: <ul style="list-style-type: none"><li>- secondary cooling of flash smelter furnace jacket cooling water circulation</li><li>- oxygen plant cooling</li><li>- turbine steam condenser and 1.7 bar boiler feed water cooler at power plant</li><li>- make-up water for flash smelting furnace reaction shaft spray cooling</li><li>- compressor cooling at compressed air station</li><li>- sealing water for pumps all over the plant</li></ul>
5.	Refur of the cooling water of item 4, above
6.	Filtered raw water to overflow pump tank item 240-518-0100 in smelter
7.	Filtered raw water return from: <ul style="list-style-type: none"><li>- smelter thickener, item 240-532-0100, overflow</li><li>- sulphur plant absorption tower circulation</li></ul>



- 
8. Tailing pond overflow circulation to absorption tower lime stone slurry mixing tank and scrubber inlet pipe in sulphur plant.
  9. Demineralized water to
    - power plant feed water tank
    - smelter FSF jacket cooling (primary circulation) as make-up water
  10. Blow-down water from boilers
  11. Scrubber outlet water from sulphur plant to lime stone slurry preparation plant
  12. Lime stone slurry to absorption tower in sulphur plant (5-6 % of solids)
  13. Potable water to different consuming points

4.7

228000

SULPHUR RECOVERY PLANT - 221250 TPA  
(OUTOKUMPU PROCESS)

**OFFSITE FACILITIES**

1. LAND, LAND DEVELOPMENT ROADS AND DRAINS

The area required for the plant is about 10 hectares (25 acres). A barbed wire fencing is proposed around the plot. Even though land is almost a level ground, some development works are required to make it suitable for installation of the proposed plant. Further about 3 k.m. length of roads with drains are provided in the plant area.

2. Water Supply System

It is proposed to draw necessary quantities of water (500 M<sup>3</sup>/hr.) for the plant from the nearby river - Sone river - which is about 2 k.m. away from the plant site. The facility will comprise of an intake well on the river bed, sand filtration system and pumps at the intake point. The water will be piped (two lines - one standby -) to the surface storage tank (10,000 M<sup>3</sup> capacity - about one day's requirement) at the plant site. Water will be pumped to DM Water Plant, Water Softening Plant and other consuming points from the above surface tank.

3. D.M. Water Plant

20 Tonnes per hour of D.M. water is required in the plant. A D.M. Plant of 480 M<sup>3</sup>/day is proposed. The D.M. plant consists of an activated carbon filter, ammonia exchanger, carbon exchanger and a mixed bed unit. There is a D.M. water storage of 200 M<sup>3</sup> in the D.M. Plant along with two numbers (1 + 1) D.M. Water pumps of required capacity for supply of D.M. water to the deaerators of the boilers. The plant is enclosed in an asbestos roofed building of 7 M x 20 M area.



4. Water Softening Plant

A water softening plant is proposed to supply semisoft water. This is for make up of cooling tower losses (3% of Cooling Water circulation), gland leaks, evaporation losses in flash furnace area etc. The total requirement of semisoft water is estimated as 270 M<sup>3</sup>/hr. The plant consists of a sodium base exchange softener and associated facilities for regeneration along with a pump and a standby to supply semisoft water to cooling tower basins and to overhead water tank.

5. Cooling Tower System

The requirement of circulating cooling water is 7900 M<sup>3</sup>/hr. A 10°C rise is expected for the return hot water. Cold water will be of 31°C which is the lowest attainable cooling water temperature in the plant location during summer months. A cooling tower station consisting of 4 cells is proposed. Cold water will be supplied to the consumer points by cold well pump (4+1). Hot well pumps (4+1) will be used for supplying hot water at the top of the cooling towers. Cooling water will be semi soft water and make up requirement will be met by the water softening plant. ~~Distribution headers (1000 mm diameter) are provided for supply/return of cooling water upto the individual consuming plants.~~

6. Fuel Oil Supply

The requirement of fuel oil is as follows :

- Light fuel oil : 1.30 TPD
- Heavy fuel oil : <sup>60.00</sup>40.00 TPD  
(LSHS)

*Outokumpu  
Correction*

Separate storage tanks of 10 days requirement each have been provided for both light fuel oil and heavy fuel oil (LSHS). The storage tank of light fuel is of 2.8 M dia and 3 metres height, while the tank for LSHS is <sup>9.5</sup>8.5 M dia and <sup>10</sup>9 M height. Steam heating coils

*Outokumpu  
Correction*

have been provided for LSHS tanks. Pumps for the unloading/supply of fuel oil are provided with the respective storages, (2+1) for heavy fuel oil and (1+1) for light fuel oil.

7. Sulphuric Acid Storage Tank

The requirement of sulphuric acid is 1.28 tonnes/day. A storage tank of 3 M diameter and 3.5 M height is proposed which will meet one month's requirement (40 tonnes). Pumps (1+1) have been provided for unloading sulphuric acid from tankers to the storage tank as well as to supply to the plant.

8. Pyrites Supply

No provision has been envisaged for storage, handling etc. of pyrites upto supply to the plant. The cost of storage, handling, supply to the plant is assumed to be covered in the transfer price of pyrites. No cost has been given for supply of top shale.

9. *Outokumpu  
correction*

Coal Supply

578      506      Smelter

The requirement of coal is 550 TPD (478 TPD in smelter plant and 72 TPD in power plant). The coal will be stored in an open yard, with fencing 70 M x 38 M (located near the railway siding) which will be sufficient to store coal of 15 days' requirement. Coal is transported to site by rail wagons. A wagon tippler cum conveyor system is provided for transferring the coal to the storage yard. Coal will be delivered to the coal feed hopper of the battery limit plant by means of a pay loader.

10. Lime Stone Storage and Slurry preparation

*Outokumpu  
Correction*

The daily requirement of lime stone is <sup>288</sup> 225 tonnes and it is to be supplied in the slurry form to the plant. One day's open storage is envisaged for lime stone; 150 M<sup>2</sup> per area is provided in this regard. Lime stone will be transported from the nearby quarry (about 100 M away) to the storage yard by means of dumpers. A front end loader will transfer the lime stone from the storage to a jaw crusher. From the jaw crusher, the material will be transferred by means of conveyors to a hammer mill and from there to wet grinding mill. The ground lime stone slurry from the mill will be fed to the mixing tank where further water will be added to make up the required consistency. The slurry will be pumped from the mixing tank to lime stone slurry feed pipe in the battery limits by means of the lime stone slurry pumps (1+1). A lime stone grinding and slurry preparation section is housed a 8 M high building 15 M x 15 M area.

11. Lime Storage

Lime powder (1.1 tonnes per day) is to be supplied at the battery limit. 10 days' storage of bagged lime is envisaged. A building of 25 M<sup>2</sup> area with asbestos roofing is proposed for storing the lime.

12. Power Receiving Station

It is assumed that the power will be made available at 110 KV by Bihar State Electricity Board at the power receiving station in the plant area. The power receiving sub-station will consist of the following equipment items :

- 110 KV Switchgear
- 40 MVA, 110/11KV Transformer
- 12 panel, 11 KV Board
- Capacitor banks for power factor improvement
- Cabling, earthing, lighting of the substation
- battery and battery charger

Provision will be there for exporting the captive power to the main grid of the electricity board. The substation will be housed in a RCC building of appropriate size.

*Outokumpu  
Correction 13.*

#### Sulphur Storage

228 000

The yearly production of sulphur is 221250 tonnes at 100% rated capacity of the plant. It is proposed to have a storage of about 1 month's production for the product sulphur. The product will be stored in open with a retaining wall around an area of 100 M x 60 M with concrete flooring ~~has been~~ provided for this purpose. 2 Conveyors of 40 M length have been provided in the battery limit plant for transporting product sulphur outside the prilling section. It is assumed that these conveyors can transport sulphur to the storage. Further another 80 M long conveyor is provided in the battery limit plant to transport sulphur upto the railway siding. This conveyor will be able to transfer the sulphur from storage to railway wagons. Hence no additional conveyors have been provided at sulphur storage area.

14. Workshop

A well maintained repairshop is ~~already~~ already available at PFCL Amjhore, hence only a lumpsum provision has to be made towards some extra machines/facilities to the existing workshop.

15. Chemical Laboratory

It is assumed that the existing laboratory can be expanded to cater the needs of the sulphur plant, also. Additional provision is made for this expansion.

16. Wash and Change

Change rooms are provided in different areas of the plant for wash and change of operating personnel.

17. Material Handling - Pay Loaders

A total of 4 Payloaders have been provided for handling of lime stone, coal and product sulphur in the respective storage areas.

18. Transport Vehicles

2 Cars, and one Jeep have been provided. Requirement of transport trucks is expected to meet from the existing pool of trucks available in the mixing plant.

19. Fire Fighting Equipment

A fire engine and associated accessories have been provided. Fire hydrant points are provided at the critical areas like coal and sulphur storages and boiler plant.

20. Township

A total of 40 dwellings of average 70 M<sup>2</sup> area have been additionally provided in the existing PFCL Township at Amjhore for catering to the proposed sulphur plant.

Addition to FIDO-specification for  
offsite facilities

21. Tailing Ponds

Two pieces of tailing ponds, each 200 x 225 x 3 m,  
are built on the plant site. The ponds are  
excavated in the ground and the surface is  
tightened with clay.

The two ponds can be utilized either separately or  
in series, depending e.g. on the annual season  
(rains) or need for emptying.

Corrections agreed  
in meeting in Outokumpu  
office on 22-23<sup>th</sup> July 85  
between PPCL/FEDO/Outokumpu

Sulphur Recovery Plant for M/s PPCL - Off-site  
Facilities - Outokumpu's Process

Off-site Facilities

(Rs. lakhs)

1. Land, land development, roads and drains	)	15.00	
2. Water Supply System		153.02	
3. D.M. Water Plant		23.00	
4. Water Softening Plant		21.03	
5. Cooling tower system		<del>223.91</del> 173.91	
6. Fuel oil supply system		9.47	
7. Sulphur(Acid Storage and Handling		1.40	
8. Pyrites supply system		-	
9. Coal supply system		55.00	
10. Limestone storage and slurry preparation		60.09	
11. Lime storage		0.50	
12. Power receiving station		154.22	
13. Sulphur storage		7.00	
14. <del>Mex</del> Workshop		10.00	
15. Chemical laboratory		15.00	
16. Wash and change		2.00	
17. Material handling - pay-loaders		83.01	
18. Transport vehicles		5.00	
19. Fire fighting equipment		25.00	
20. Township		<u>50.04</u>	
A. TOTAL UPTO (1-20)		913.69	863.69
B. ENGG., PROCUREMENT, PROJECT MANAGEMENT AND SITE MANAGEMENT	) @ 10%	<u>91.37</u>	<u>86.37</u>
C. CONTINGENCIES @ 5%		<u>1005.06</u>	<u>950.06</u>
GRAND TOTAL (A+B+C)		<u>1050.74</u>	<u>1055.31</u>
Tailing pond			75.00
			<u>1072.56</u>
Ex. D. (included in above)		58.26	
S.T. ( — " — )		21.06	

Operating Personnel (Off-sites)

<u>Sl. No.</u>	<u>Particulars</u>	<u>No. of Persons</u>	<u>Remarks</u>
1.	Water Supply System	4	(at river side)
2.	Water treatment, DM Plant, ) Cooling Tower etc. )	8	
3.	F. end loaders	24	(pay-loader)
4.	Wagon tippler operators	4	
5.	Slurry preparation section operators	8	
6.	Dumper operators	4	
7.	Electricians (Sub-station operation)	4	
8.	Sulphur storage area operators	4	(Accounting of sulphur export)
9.	General drivers	12	
10.	Off-site facilities	4	
		<u>76</u>	
	<b>Total:</b>	<u>76</u>	

Maintenance Personnel (Total for main plant & off-sites)

1.	Riggers	16
2.	Riggers	16
3.	Helpers	48
4.	Machinists	8
5.	Leadsmen	3
6.	Electricians	8
		<u>99</u>
	<b>Total:</b>	<u>99</u>



SULFUR RECOVERY PROJECT FROM ANTIHORE PYRITES (POCL)  
Motor power of Offsite Machinery

	No	HP/unit	Total HP
(1) Fuel oil pumps	2	50	5.0
(2) H. Fuel oil pumps	3	7.5	7.5
(3) Lime Stone conveyor	1	8.0	8.0
(4) Cooking tower fan	4	100.0	400.0
(5) Hot well pumps	4+1	200.0	800.0
(6) Cold well pumps	4+1	450.0	1800.0
(7) DM water pumps	1+1	5.0	5.0
(8) Filtered water pumps	1+1	200.0	200.0
(9) Softener water pump	1+1	50.0	50.0
(10) Sulfuric acid pump	1+1	1.0	1.0
(11) Wet grinding mill	1	200.0	200.0
(12) Series water pump at river bed	2+1	200.0	200.0
(13) Jaw crusher, hammer mill, coal conveyor, hot stone slurry pump etc		200.0	200.0
<b>TOTAL</b>			<b>3876.5</b>

TOTAL POWER CONSUMPTION 80% of HP

$$3876.5 \times 0.8 = 3101.2 \text{ HP}$$

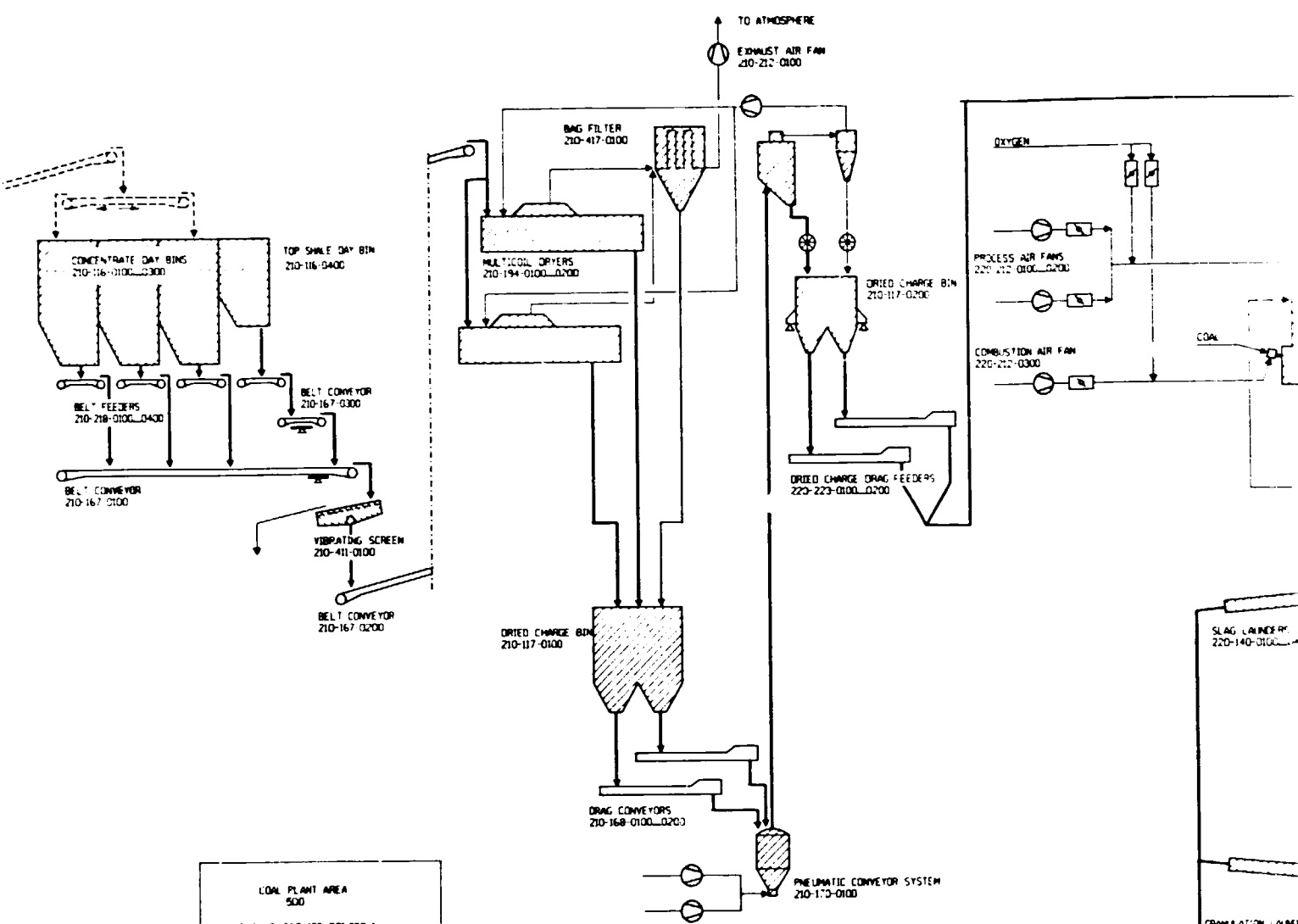
$$= 3101.2 \times 746 \div 1000$$

$$= 2313.5 \text{ KW}$$

2.3 MW



1. This drawing is a schematic diagram of the material handling system for the plant. It shows the flow of material from the day bins through various conveyors, feeders, and processing units to the final product.



COAL PLANT AREA  
 500  
 DWG. NO. 360 100 901 008-1

POWER PLANT AREA  
 600  
 DWG. NO. 360 100 901 009-1

OXYGEN PLANT AREA  
 700

LIME STONE SLURRY PREPARATION AREA  
 800

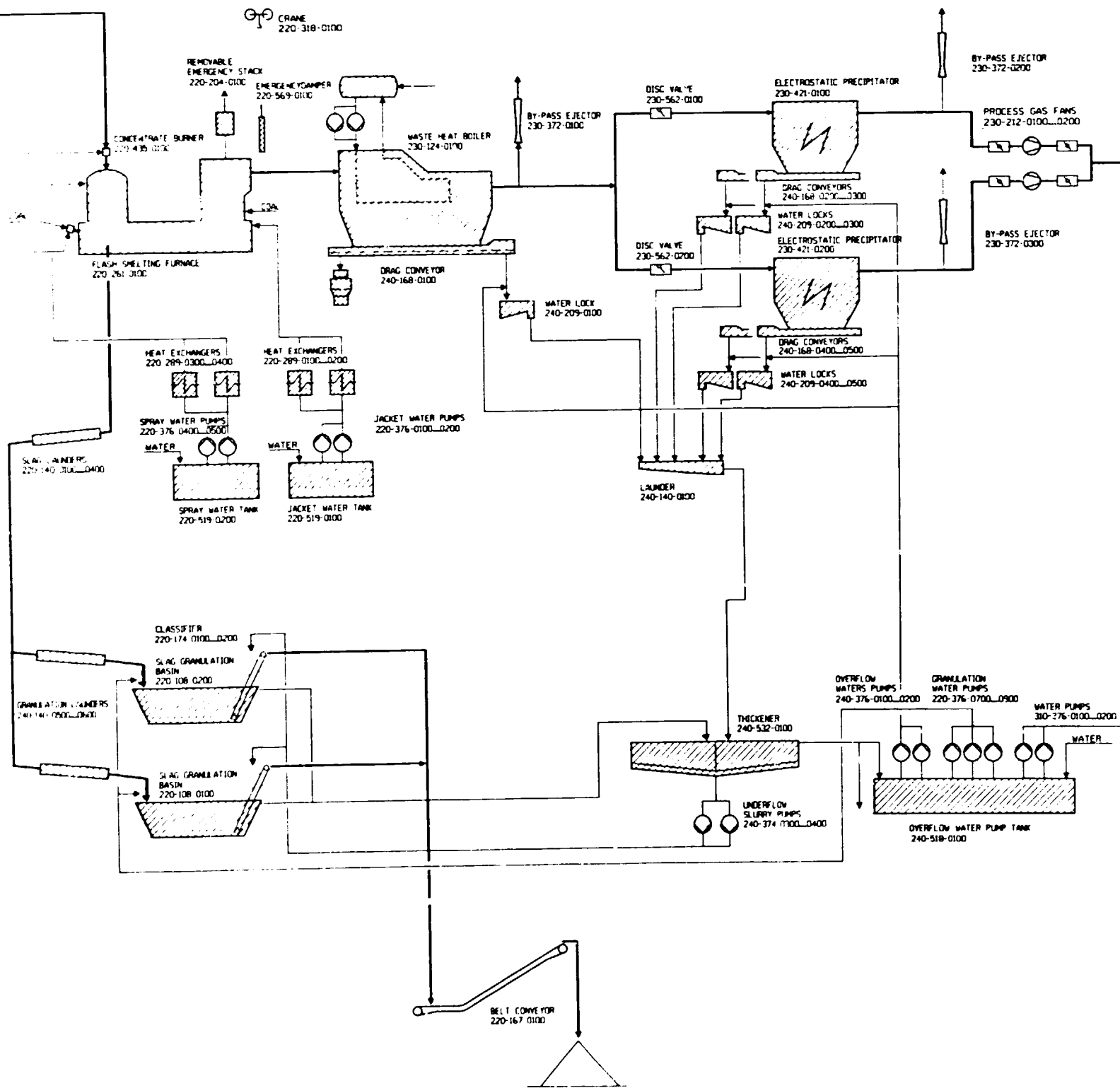
WATER TREATMENT PLANT AREA  
 900

PROCESS AIR STATION  
 950

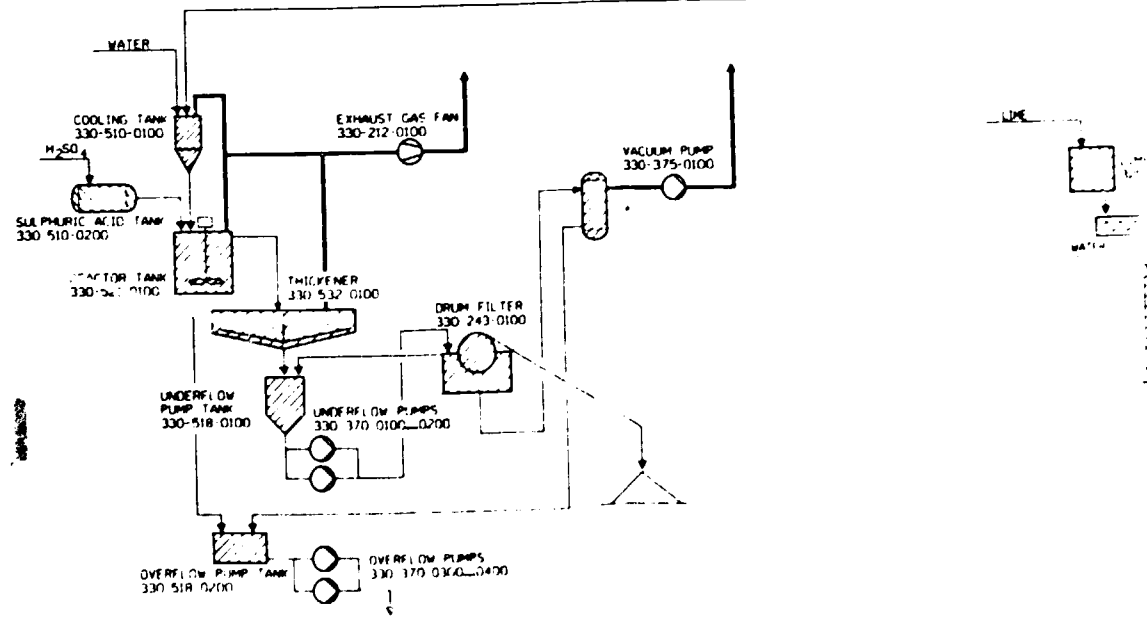
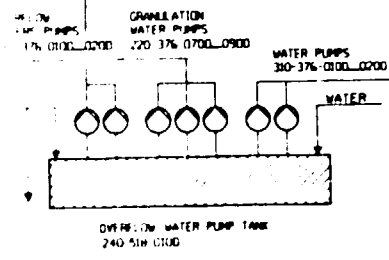
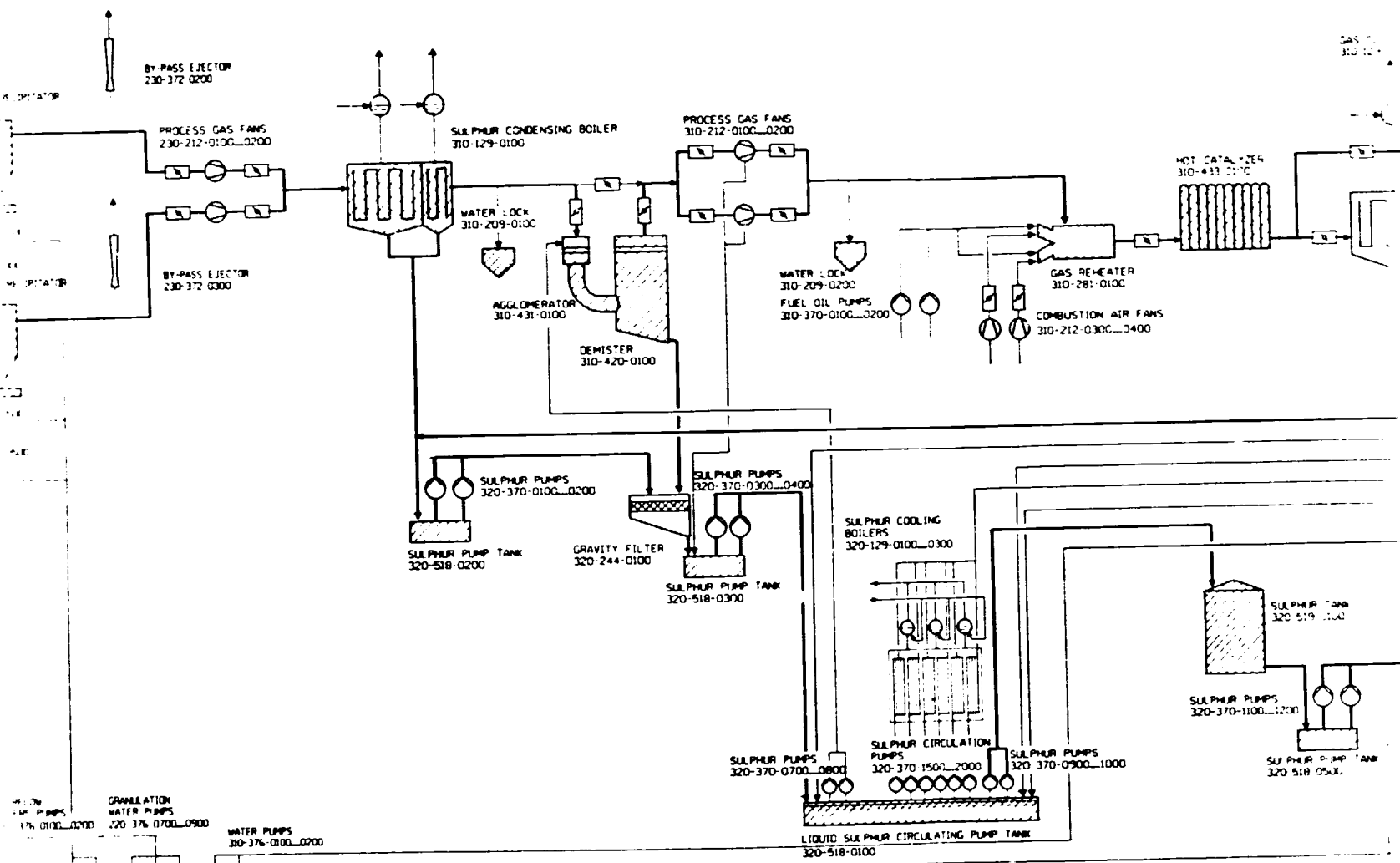
# SECTION 1

SLAG LAUNCHER  
 220-140-0100

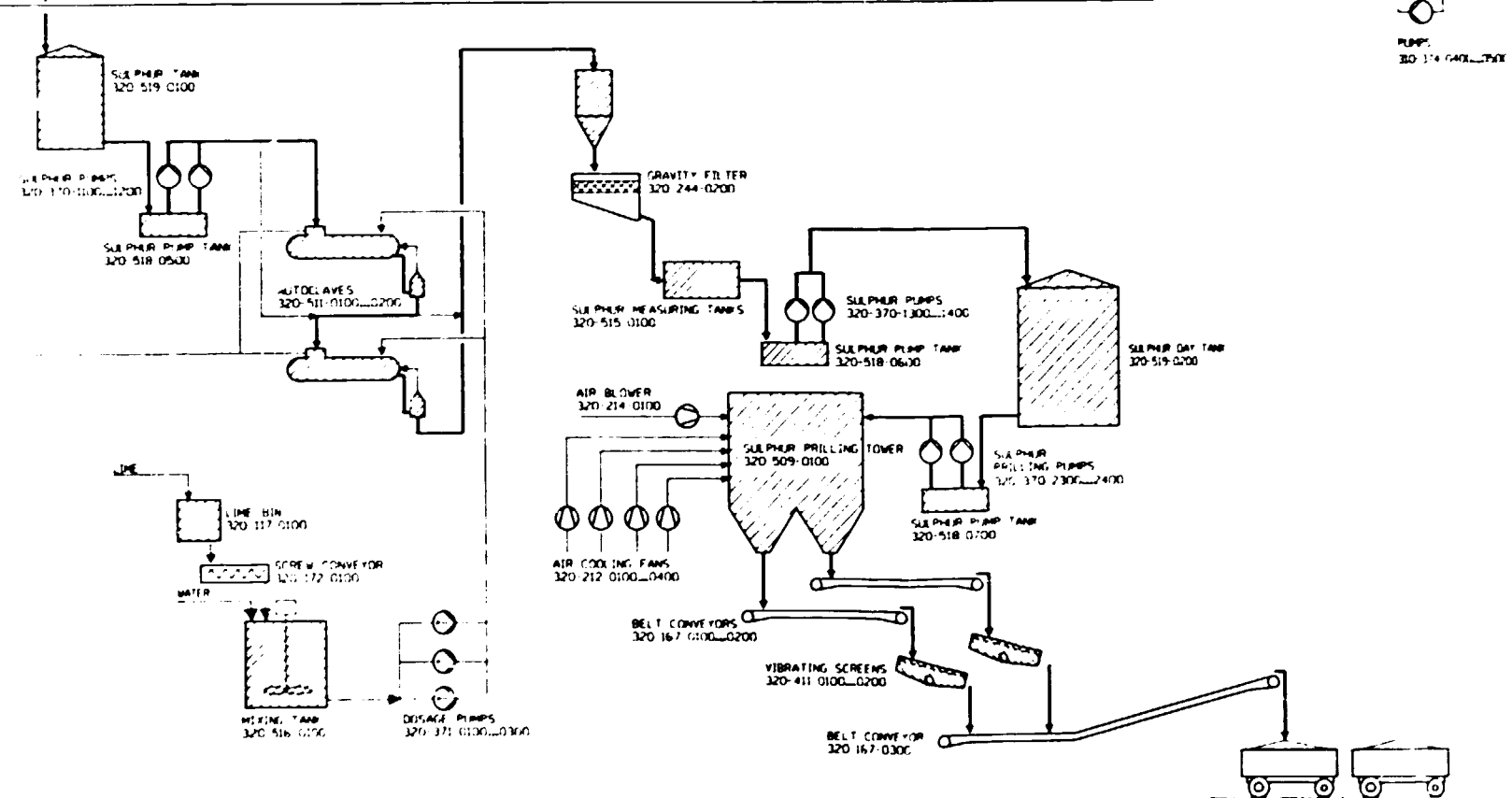
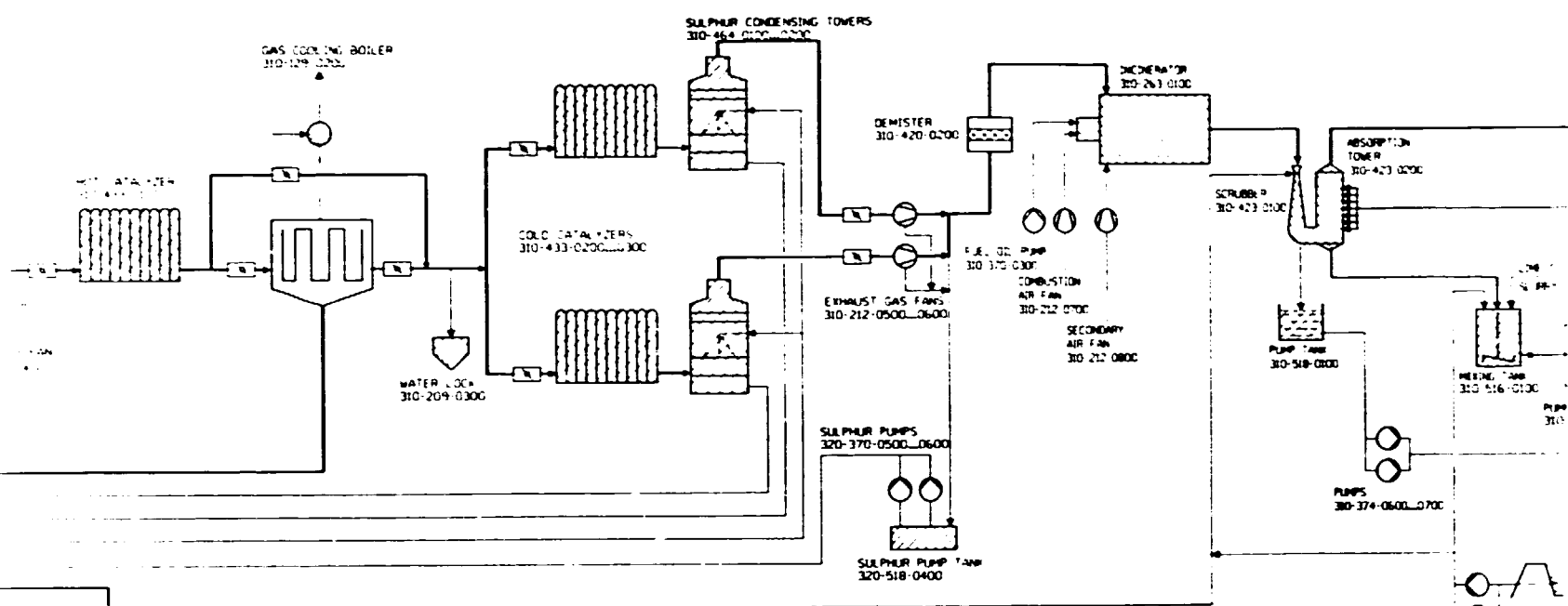
GRANULATION LAUNDERS  
 240-140-0500, 0600



SECTION 2

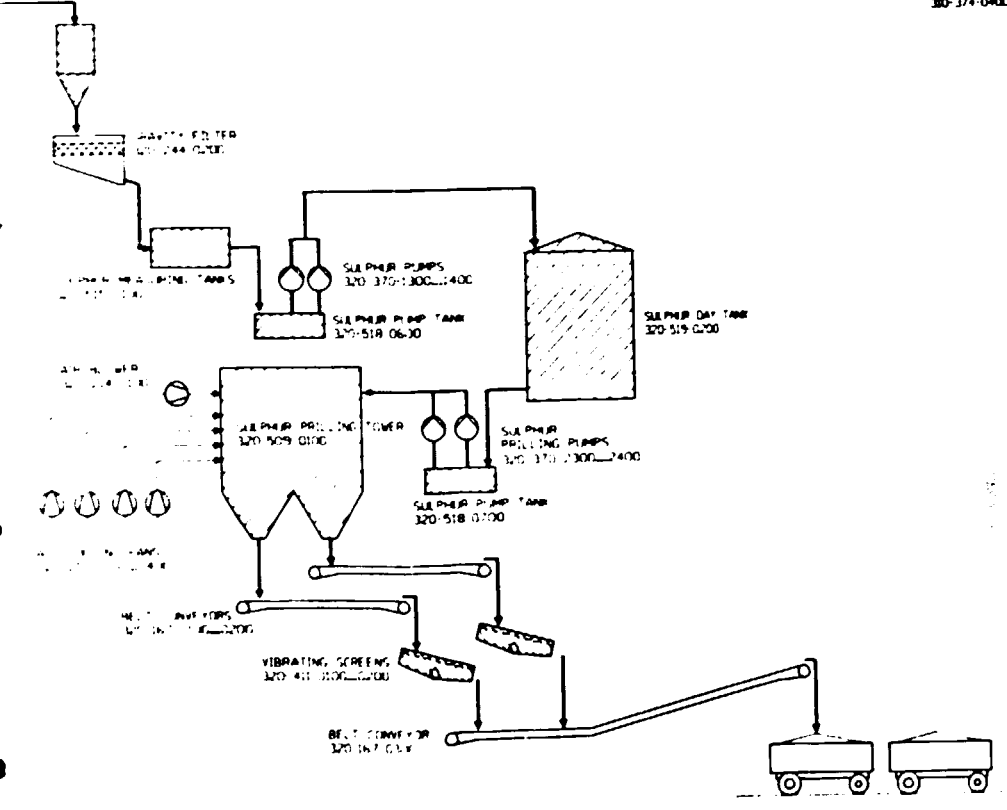
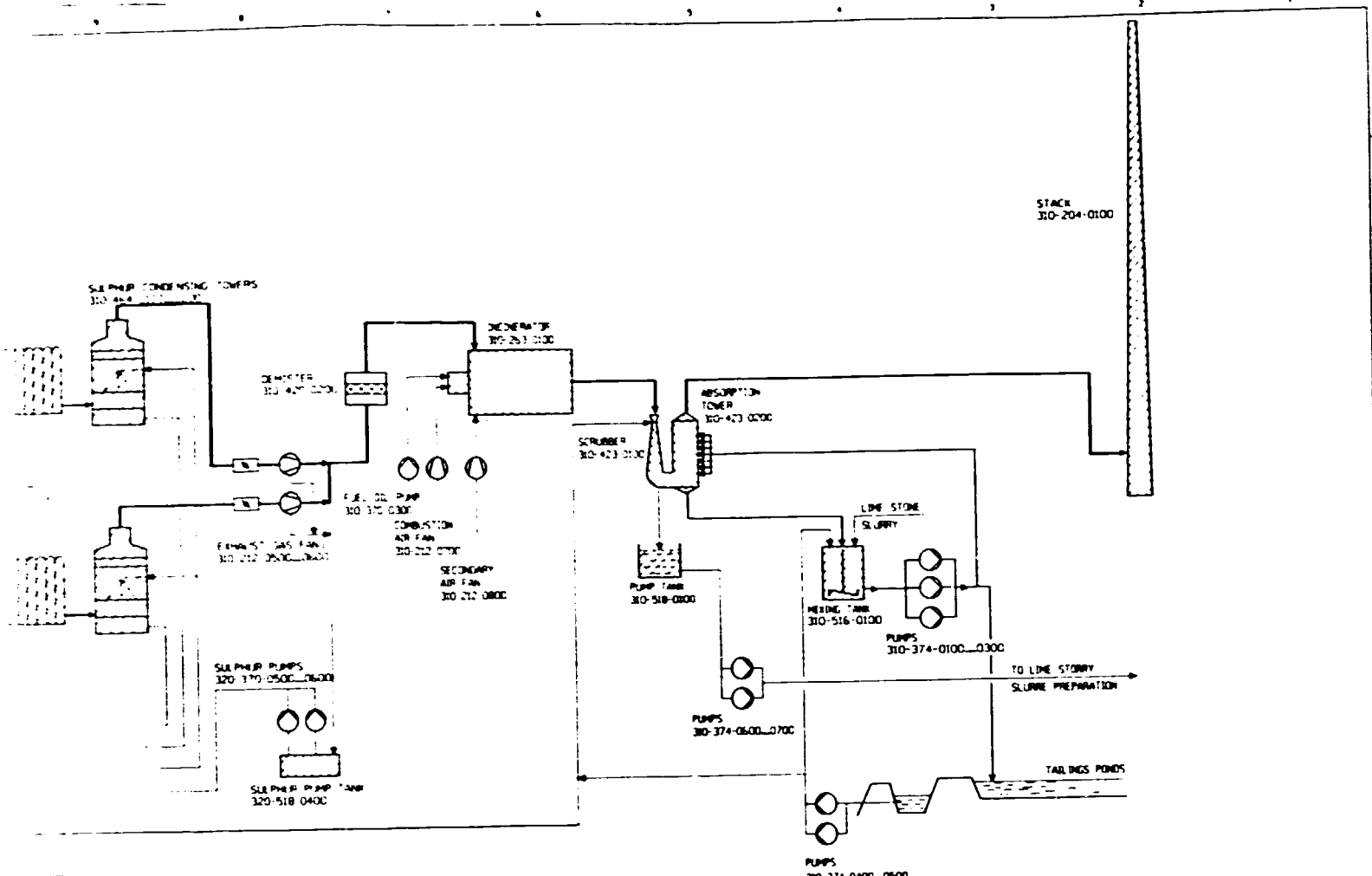


# SECTION 3



**SECTION 4**

NO.	DESCRIPTION	QTY.	UNIT	REMARKS
1	...	...	...	...
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50	...	...	...	...

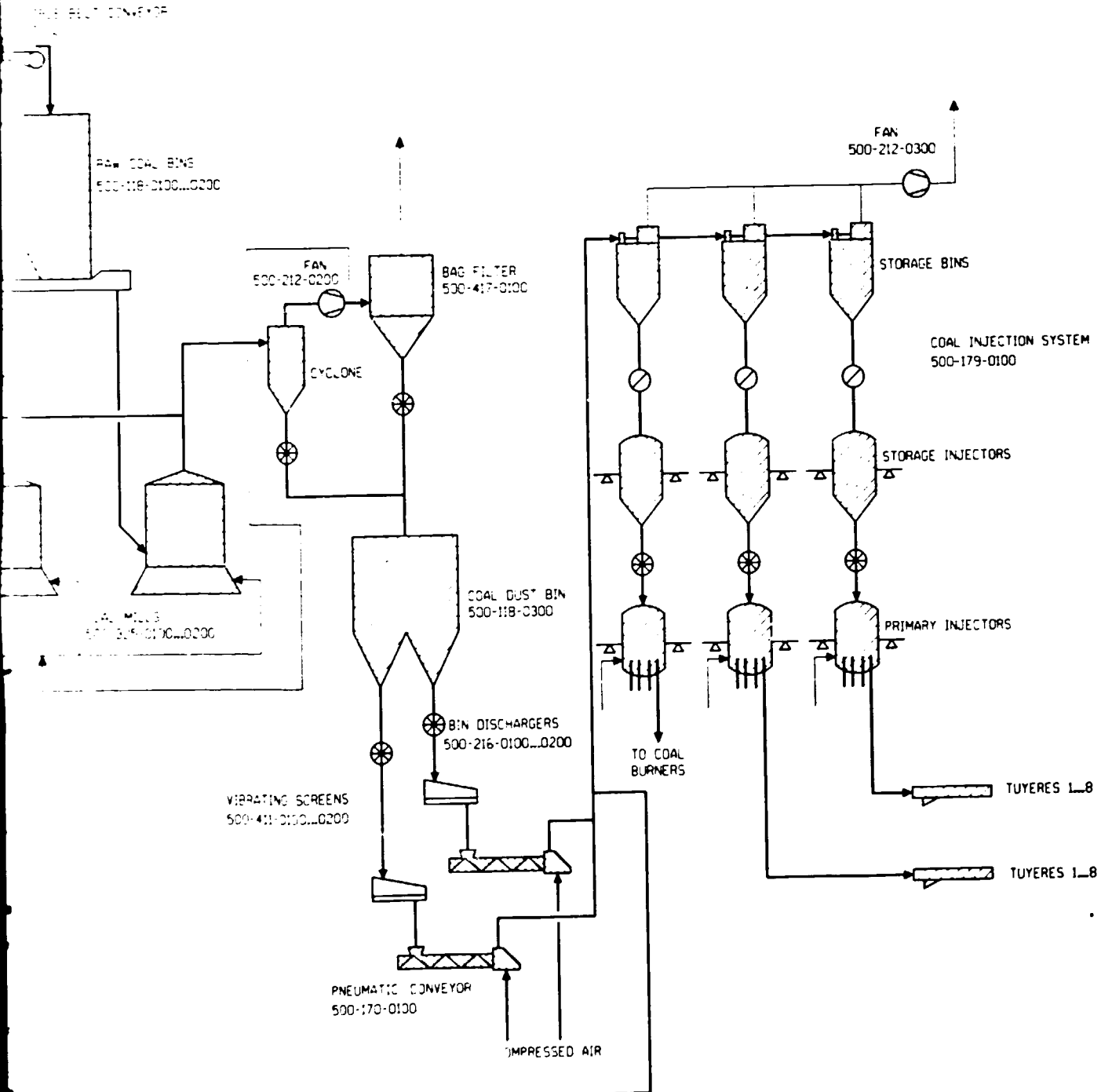


# SECTION 5

<b>OUTOKUMPU ENGINEERING</b>	DRAWN: J. L. MAY 1987 CHECKED: J. L. MAY 1987 APPROVED: J. L. MAY 1987	PROJECT:
	CLIENT:	SHEET NO. 5
TITLE:	DATE:	SCALE:
PROJECT LOCATION:	DRAWN BY:	CHECKED BY:



6 5 4 3 2 1



SECTION 2

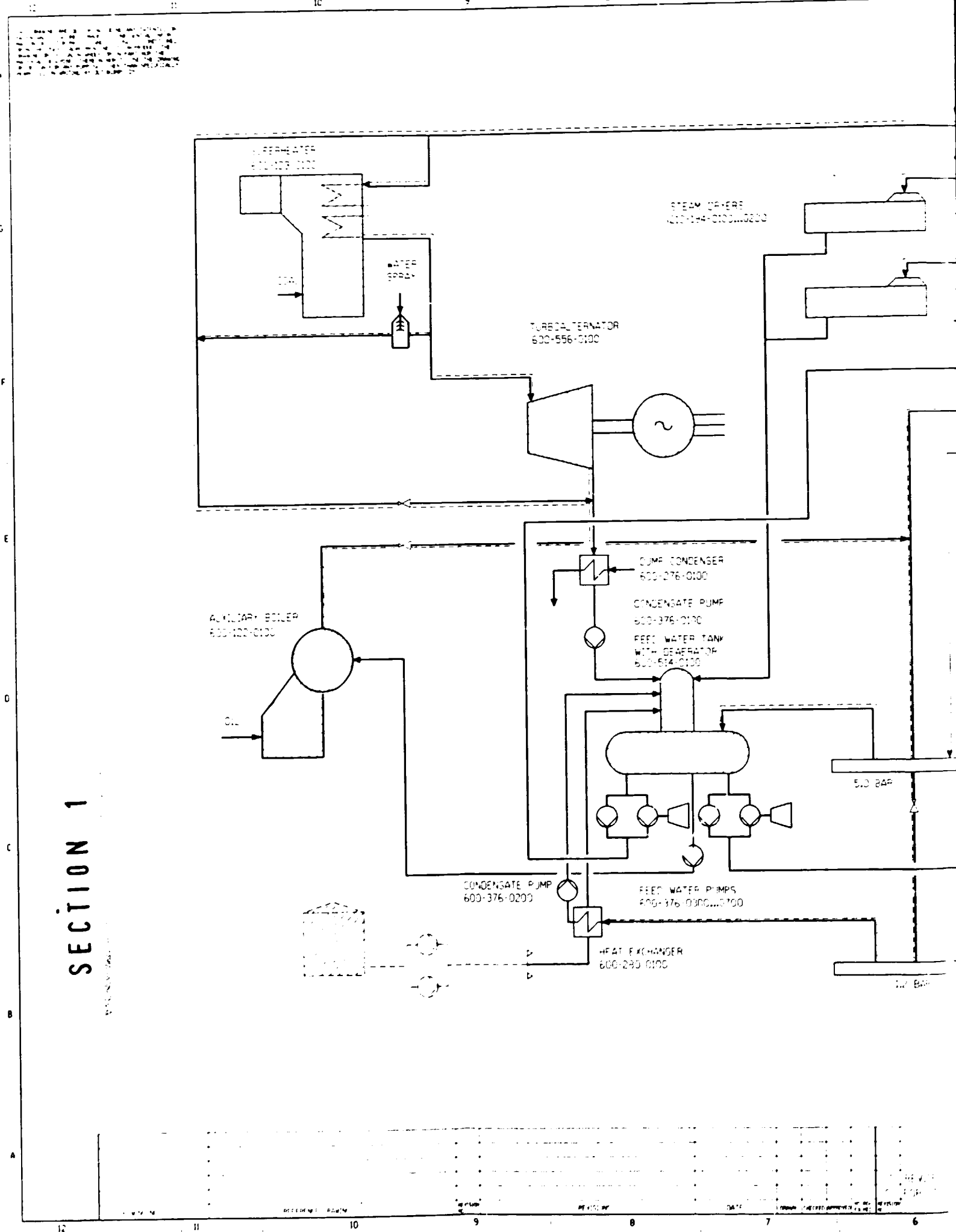
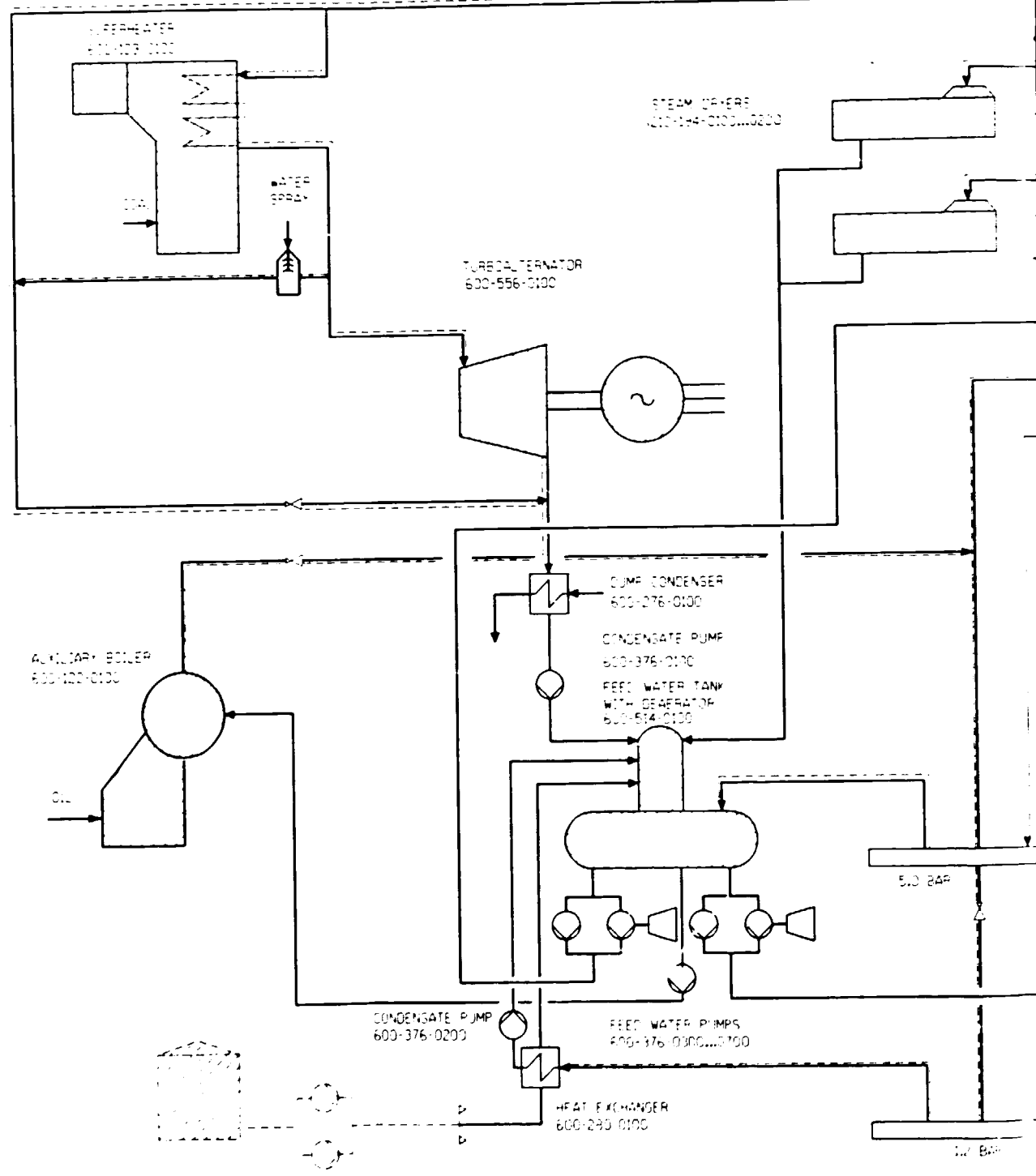
<b>CUTOKUMPU OY</b> ENGINEERING DIVISION	DESIGNED	28 JUNE 1984	G.J.
	CHECKED		
	APPROVED		
CLIENT	PYRITES PHOSPHATES & CHEMICALS LTD		CLIENTS DWG. NO.
PROJECT	PPCL PYRITE SMELTER		
DRAWING TITLE	COAL PLANT EQUIPMENT DIAGRAM	SCALE	REF. DWG.
			DWG. NO. 360 100 901 009-1
			REV. NO. 1

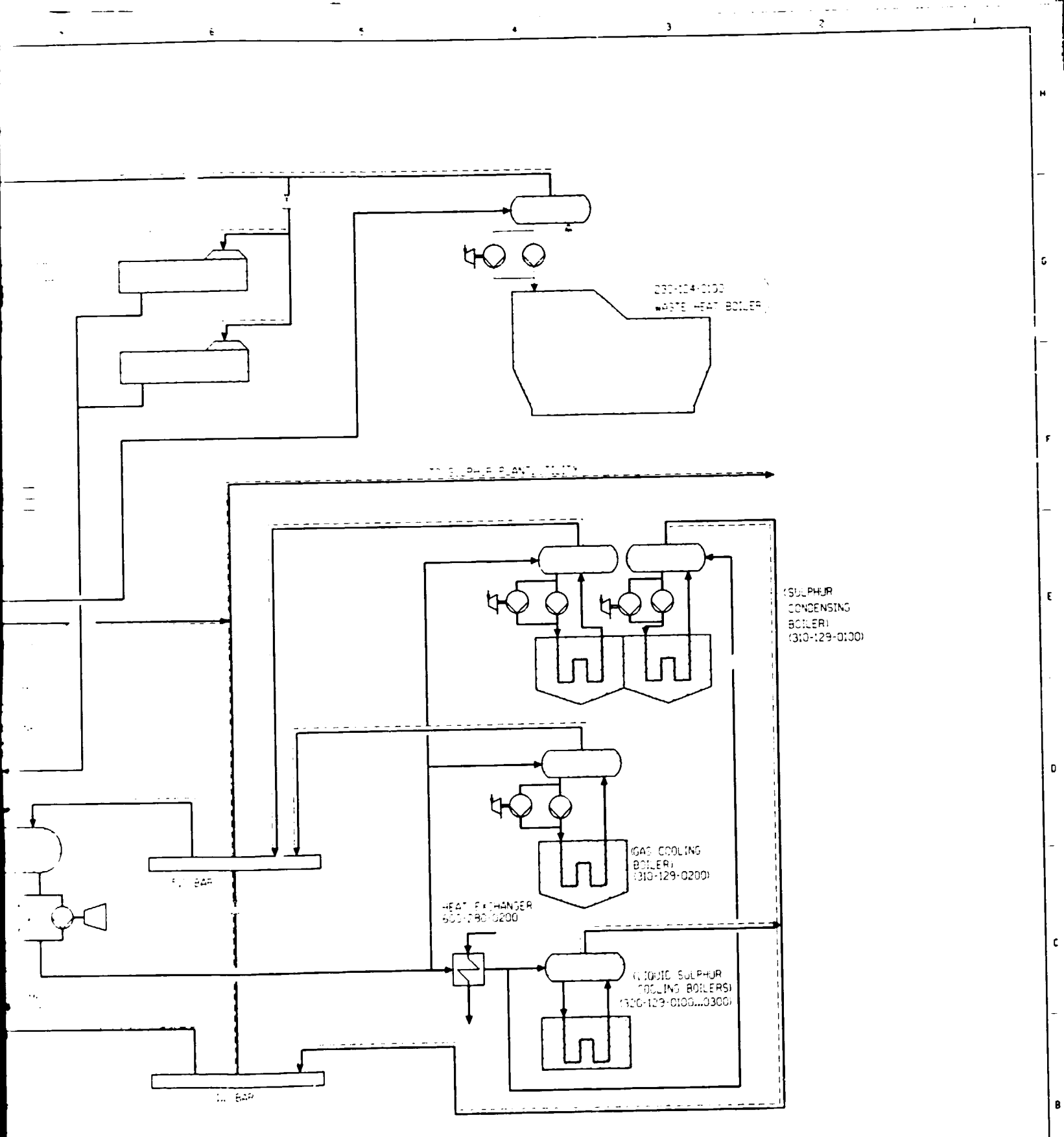
NOV 1984  
 28 JUNE 1984  
 DWG. NO. 360 100 901 009-1

6 5 4 3 2 1



SECTION 1





# SECTION 2

 <b>OUTOKUMPU OY</b> ENGINEERING DIVISION	DESIGNED	28. JUNE 1984	GW
	CHECKED		
	APPROVED		
CLIENT	PRYORITE, PHOSPHATES & CHEMICALS LTD		CLIENT'S Dwg. NO.
PROJECT	SULPHUR PLANT IMP. TEST		
DATE	28. JUNE 1984	SCALE	REF. Dwg.
TITLE	SECTION 2		REV. NO.
			1

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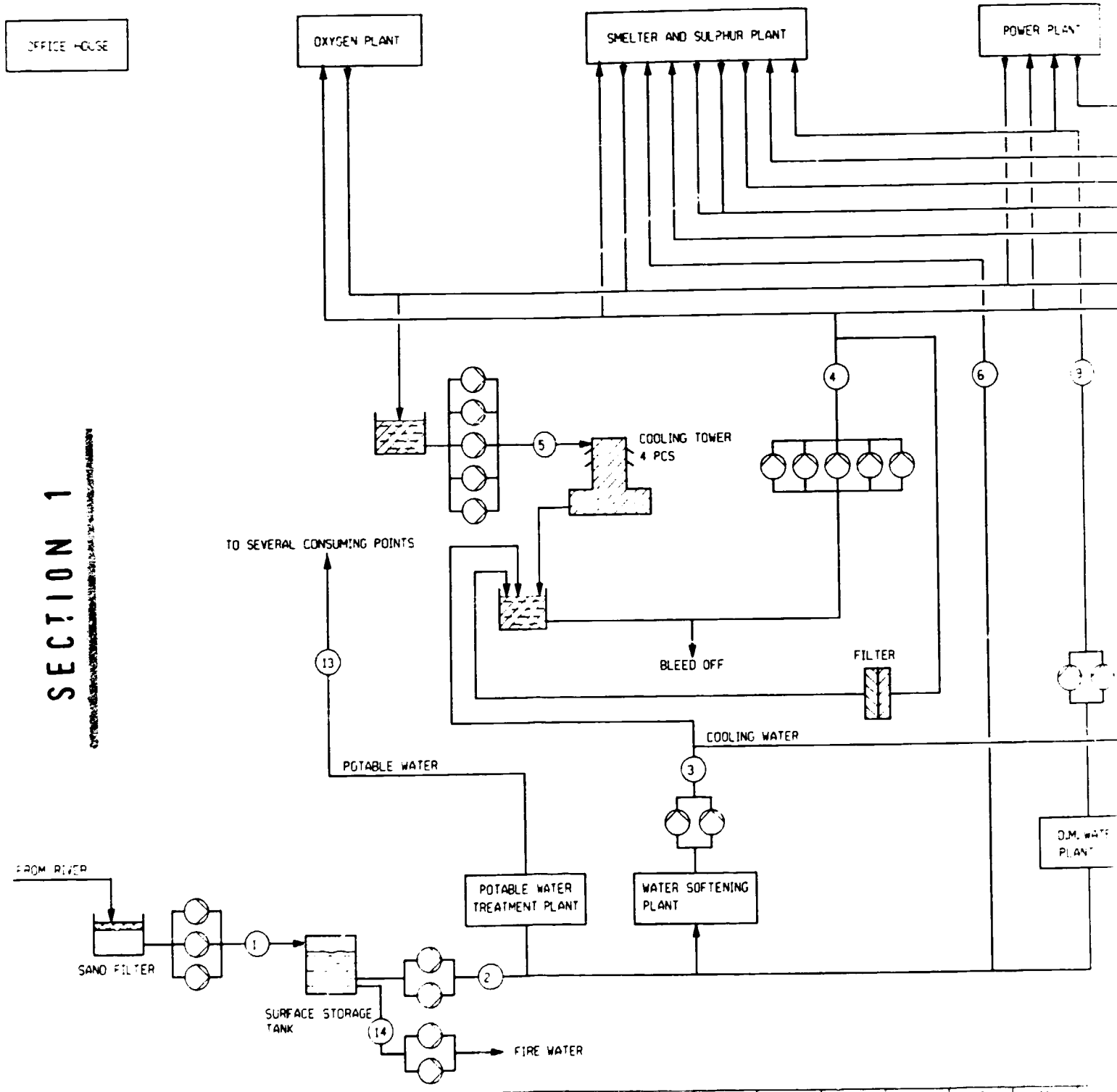
OFFICE HOUSE

OXYGEN PLANT

SMELTER AND SULPHUR PLANT

POWER PLANT

SECTION 1



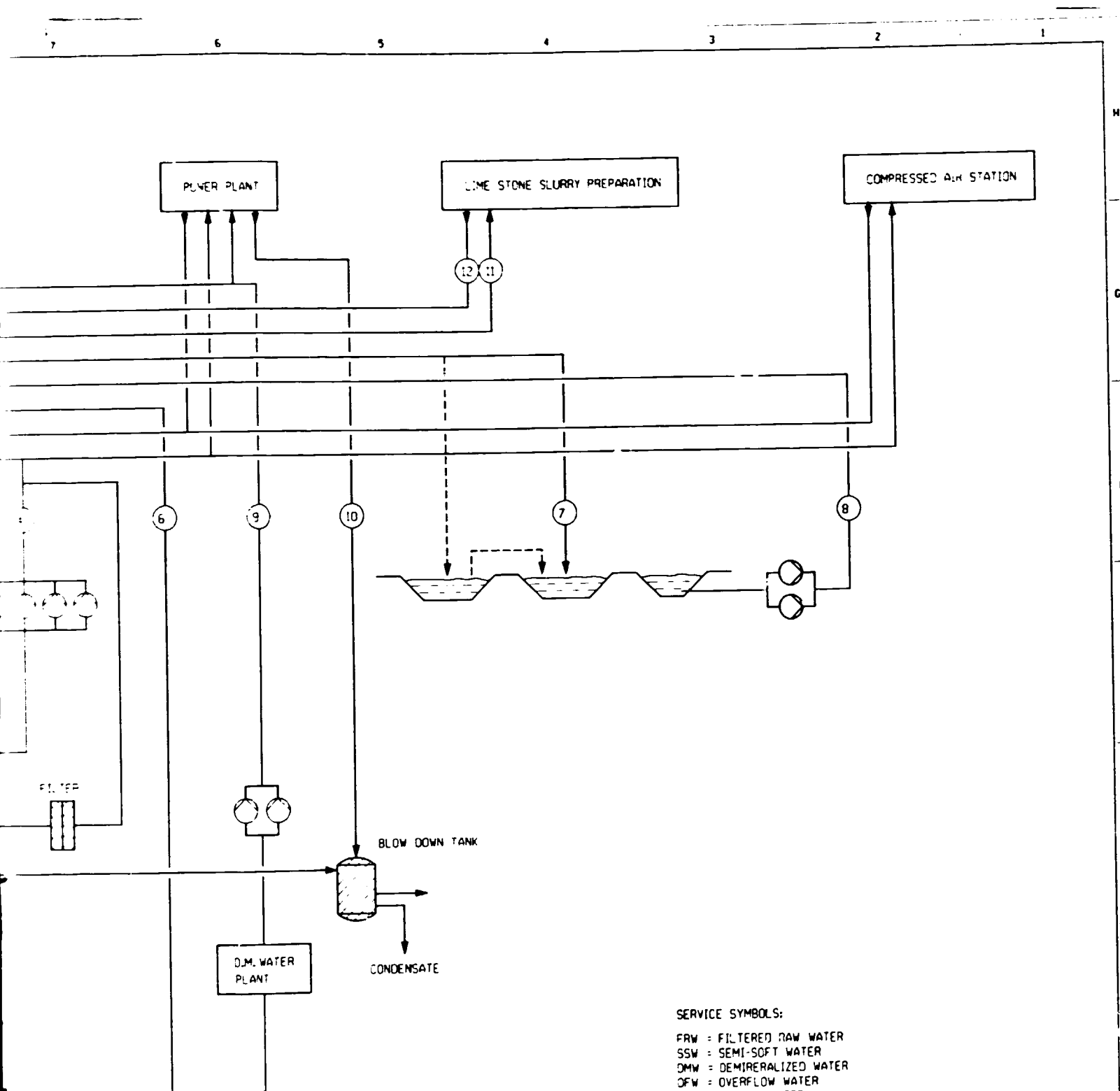
STREAM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SERVICE SYMBOL	FRW	FRW	SSW	SSW	SSW	FRW	FRW	OFW	OPW	OPW	SM	SM	PW	FW
FLOW DESIGN m <sup>3</sup> /h	900	900	250	7900	7900	130	290	210	20	20	200	200	5	200

DATE: \_\_\_\_\_

DESIGNED BY: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_



**SERVICE SYMBOLS:**

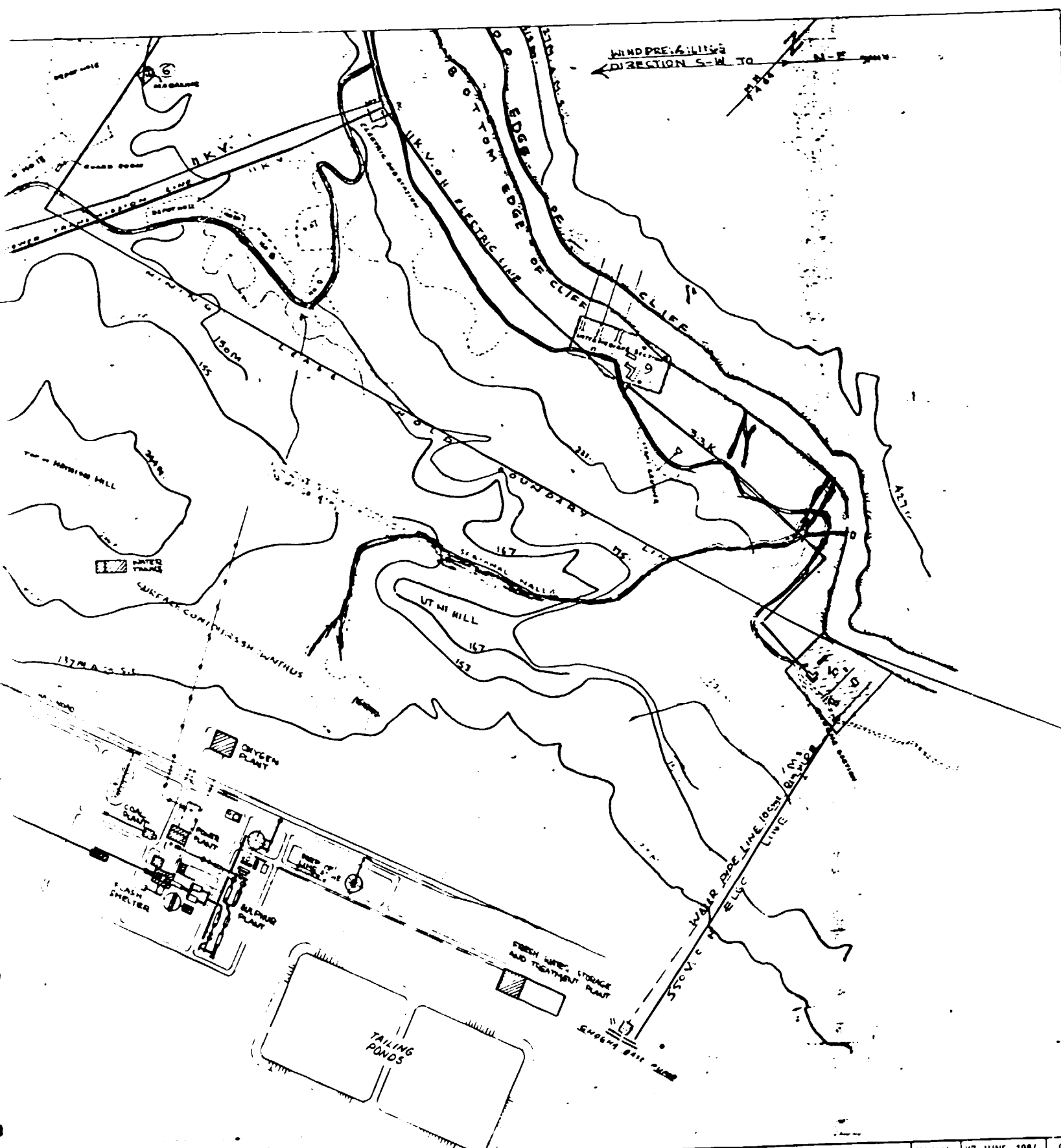
- FRW = FILTERED RAW WATER
- SSW = SEMI-SOFT WATER
- DMW = DEMINERALIZED WATER
- OFW = OVERFLOW WATER
- SW = SLURRY WATER
- PW = POTABLE WATER
- FW = FIRE WATER

## SECTION 2

11	12	13	14
SW	SW	PW	FW
200	200	5	200

<b>OUTOKUMPU ENGINEERING</b>	DESIGNED	23.08.1985	AW1
	CHECKED		
	APPROVED		
CLIENT	PYRITES PHOSPHATES & CHEMICALS LTD		CLIENTS ENG NO.
PROJECT	PREL PYRITE SMELTER		
DRAWING TITLE	FLASH SMELTER AND SULPHUR PLANT WATER MAIN & DOW DIAGRAM	SCALE	REF. ENG. NO. 136 120 301 012 1
DATE	12.28.1985	DRW. CONTROL APPROVED	REV. NO. 2



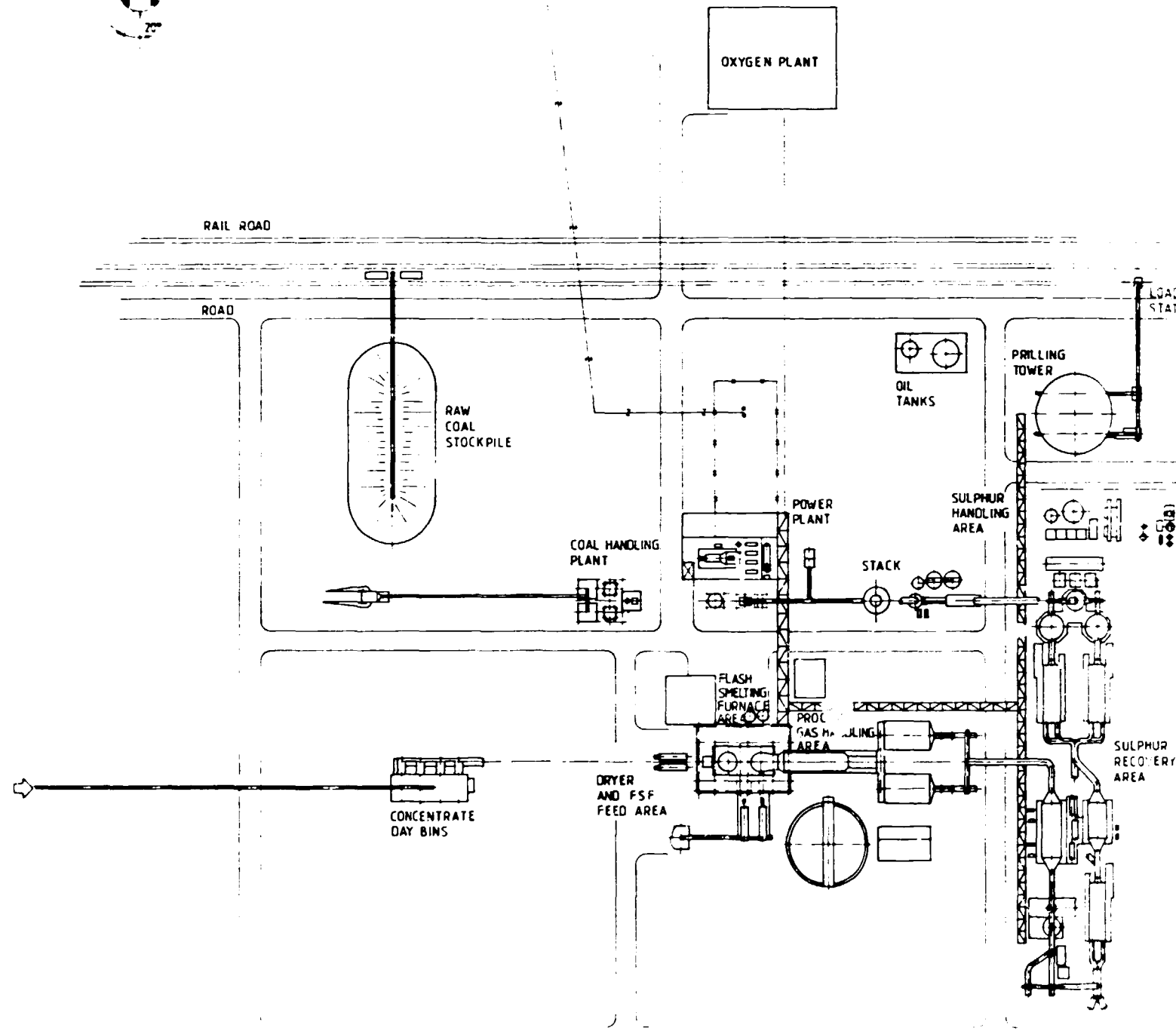


SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	DESIGNED	27 JUNE 1984	GW
	CHECKED		
	APPROVED		
CUSTOMER	PYRITES, PHOSPHATES & CHEMICALS LTD		
PROJECT	PPCL PYRITE SMELTER		
SCALE	1:4000	360 100 902 004 9 7	

REVISED	21 AUG 1985	MHN	
REV SEC	15 NOV 1984	GW	
FOR STUDY	27 JUNE 1984	GW	

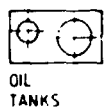
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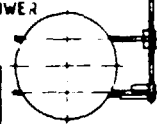
# SECTION 1

NO.	DATE	REVISIONS
2		REVISED
1		REF. SFD
0		FOR STUDY

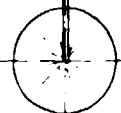
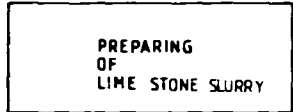
PLANT



PRILLING TOWER



LOADING STATION



FRESH WATER

POWER PLANT

SULPHUR HANDLING AREA

WASTE LIQUID HANDLING AREA

STACK

PROCESS GAS HANDLING AREA

SULPHUR RECOVERY AREA

TAILING PONDS

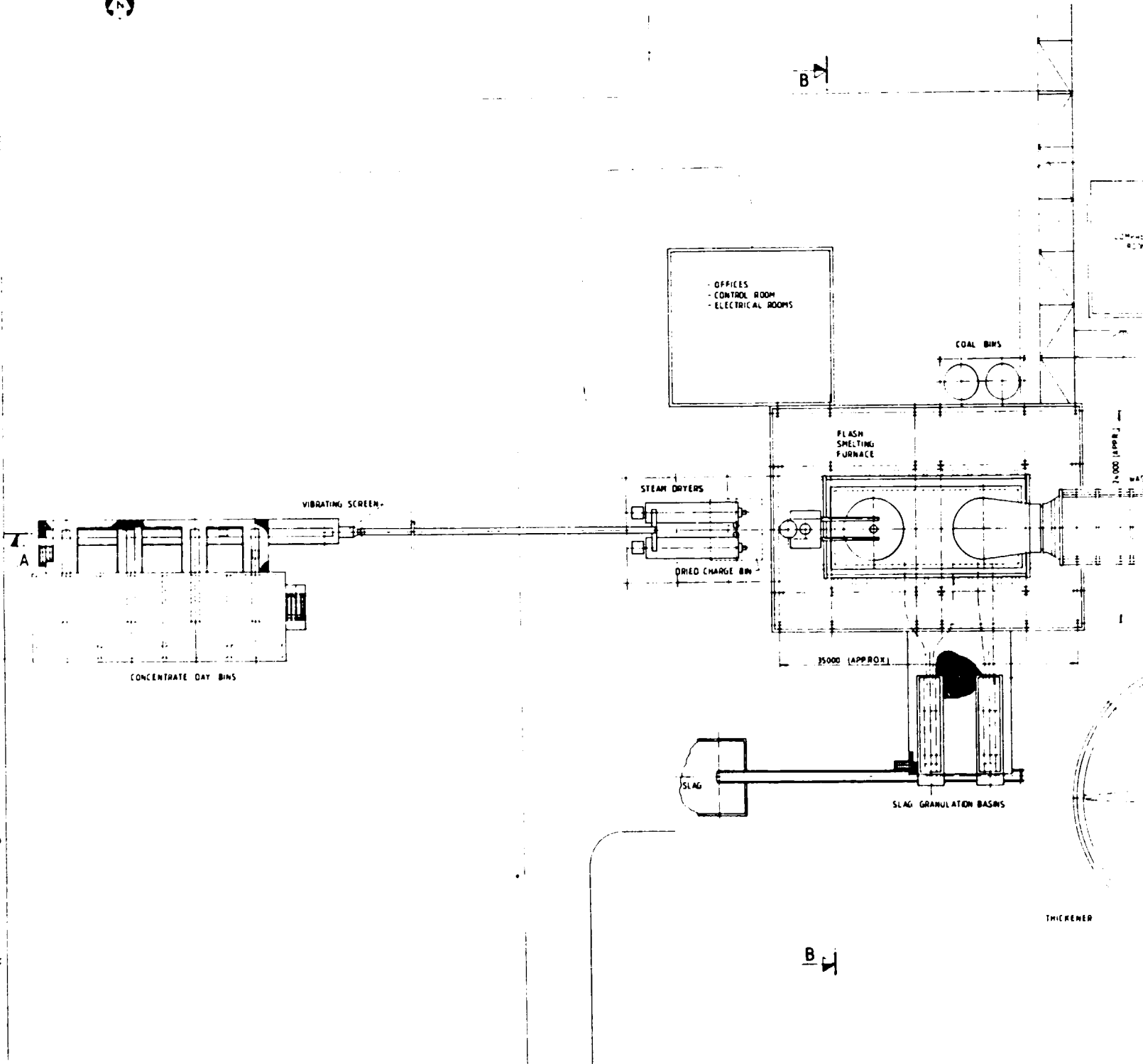
# SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	REVISIONED	25 JUNE 1984	GW
	CHECKED		
	APPROVED		
CLIENT		CLIENT'S DIAG. NO.	
PYRITES, PHOSPHATES & CHEMICALS LTD			
PROJECT		SCALE	
PPCL PYRITE SMELTER		1:1000	
FLASH SMELTER AND SULPHUR PLANT		DWG. NO.	
PLOT PLAN		960 100 902 005-1	
REVISED		REV. NO.	
FOR STUDY		REV. DATE	
REVISIONS		REV. BY	

2	REVISED	21 AUG 1985	MHN
1	REVISED	15 NOV 1984	
0	FOR STUDY	10 JULY 1984	THM

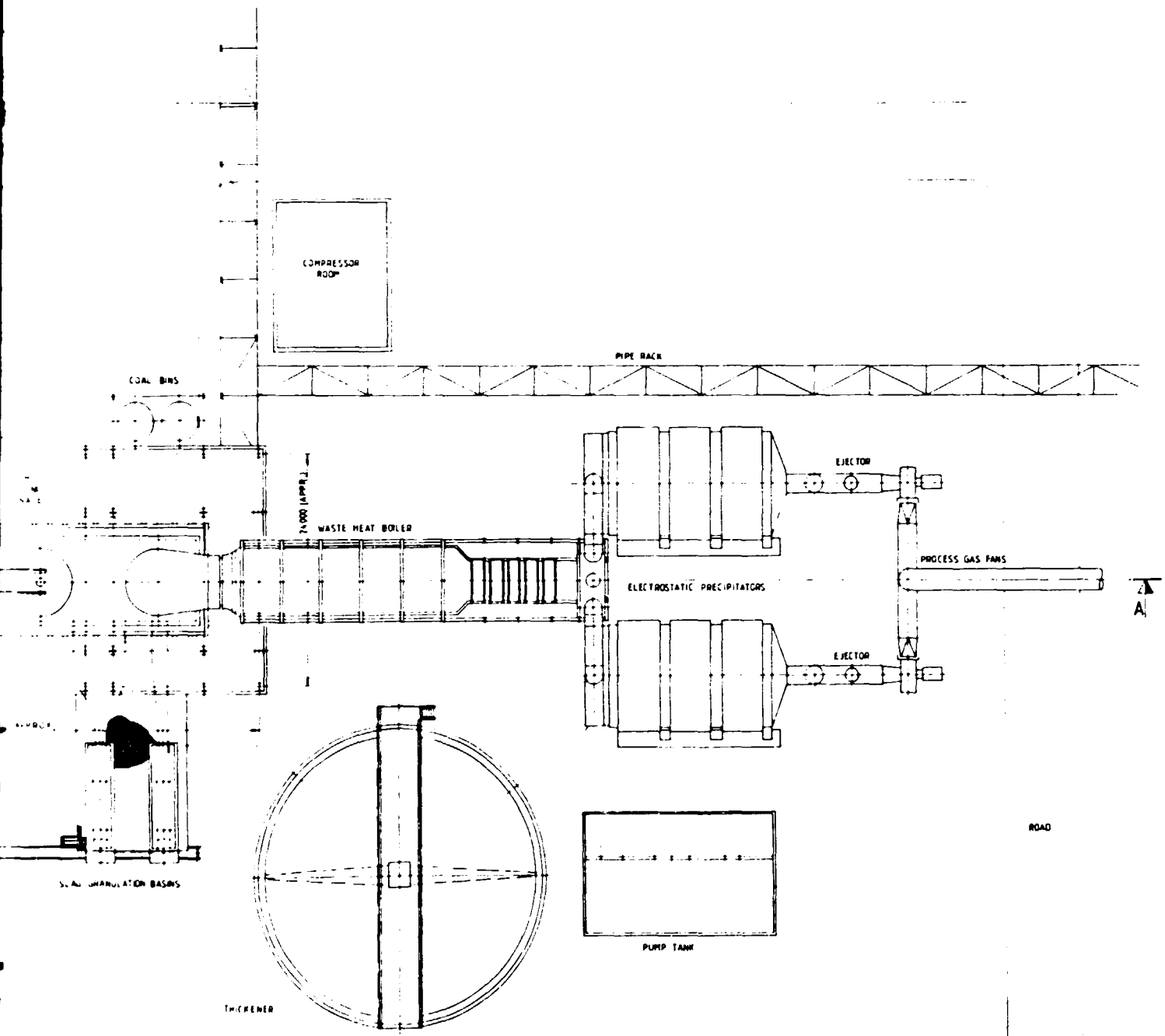


100-100-902-0010



# SECTION 1

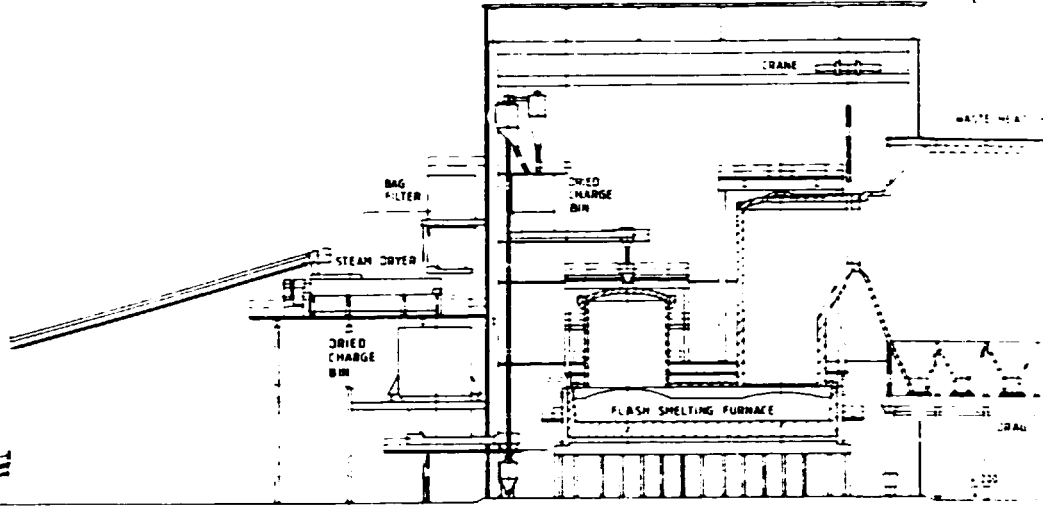
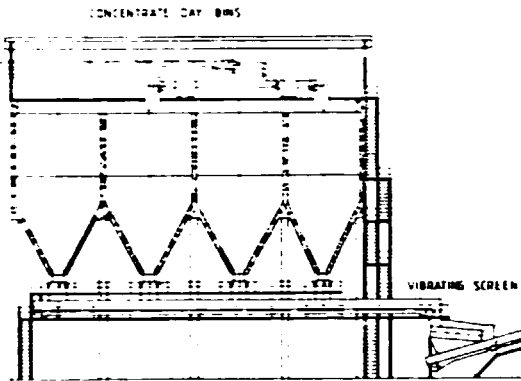
100-100-902-0010	SECTIONS A A AND B B	REVISED DRAWING
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# SECTION 2

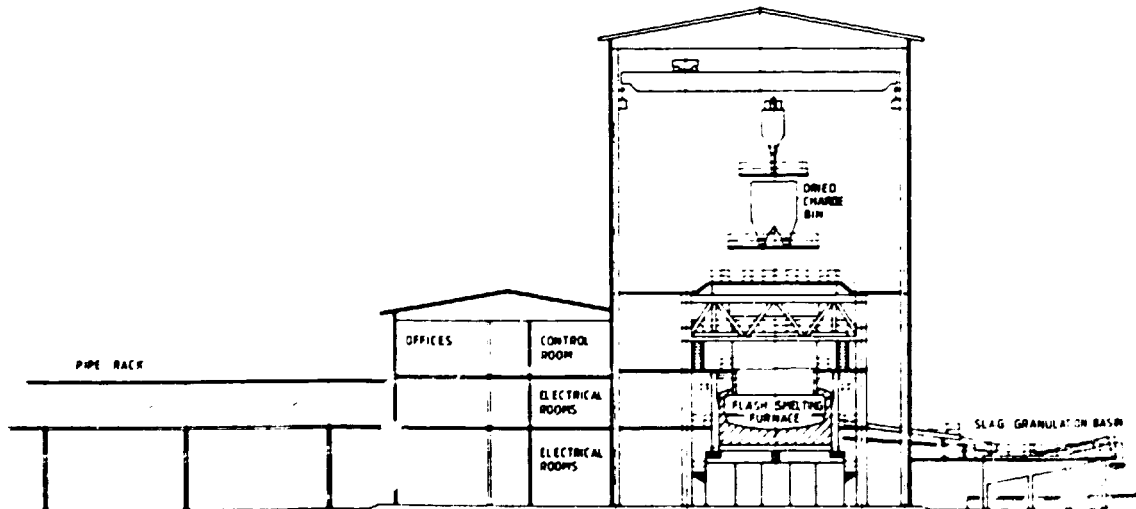
<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	APPROVED 31 MAY 1964 GW
	PROJECT PYRITES PHOSPHATES & CHEMICALS LTD
DRAWING NO. 100 100 02 06 0 0	SCALE 1:200
TITLE PYRITE SHELTER FLASH SHELTER AREA PLANT LAYOUT PLAN	DATE 31 MAY 1964

NO.	DATE	BY	CHKD	APPD	REVISION



35 000 (APPROX)

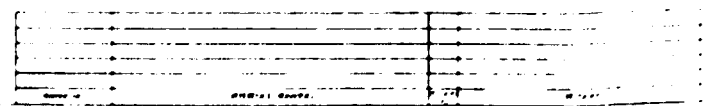
SECTION A - A

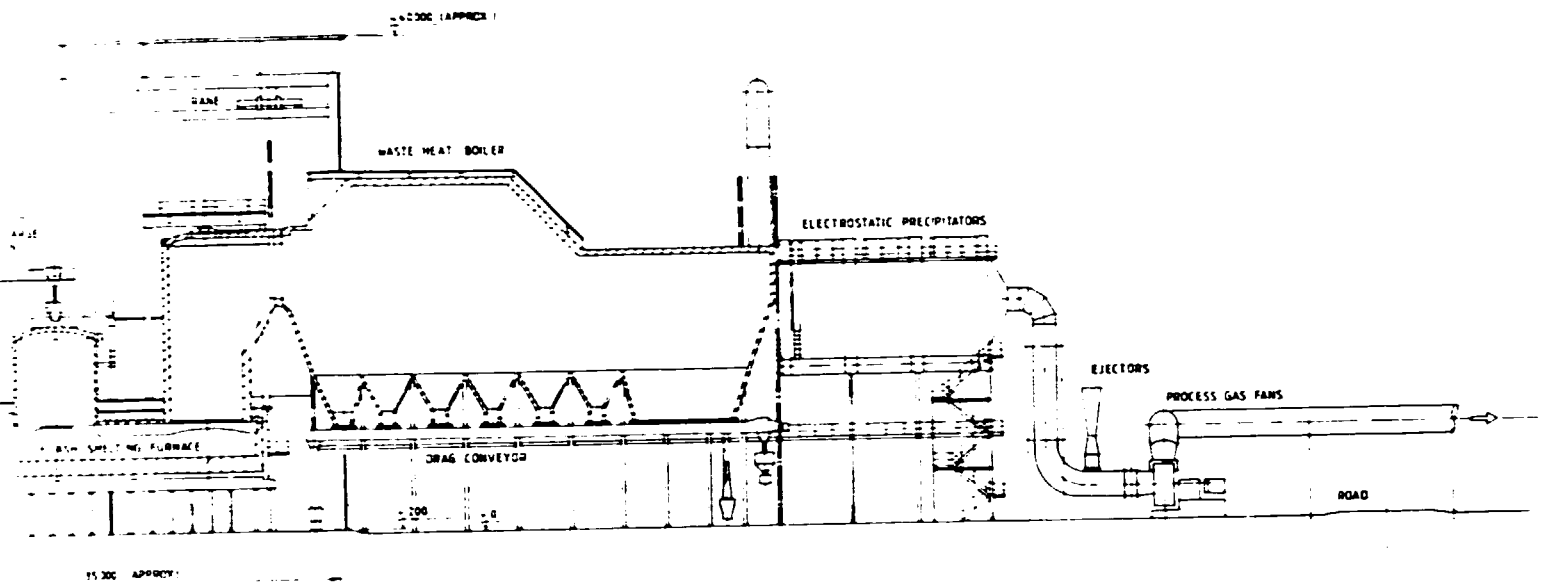


74 000 (APPROX)

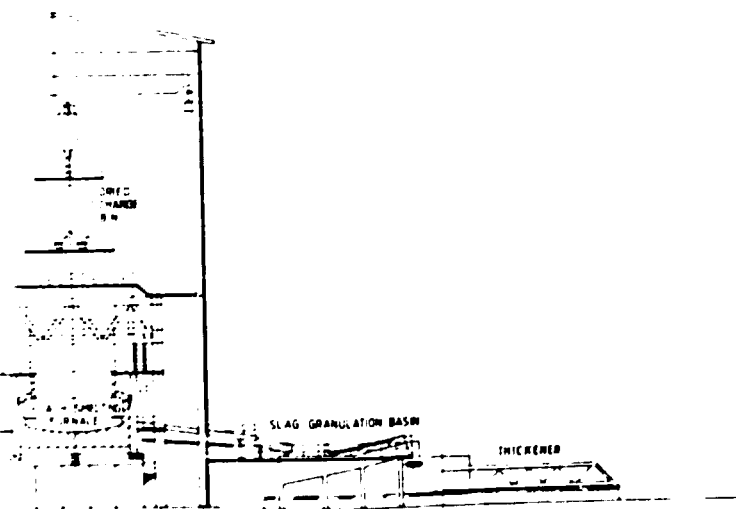
SECTION B - B

SECTION 1





SECTION A - A



SECTION B - B

## SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION		20 MAY 1984 Gw
PROJECT PYRITES PHOSPHATES & CHEMICALS LTD		SHEET NO. 10
DRAWING NO. PYR. PYRITE SMELTER		100 927 006 3
SECTION FLASH SMELTER AREA PLANT LAYOUT SECTIONS A - A AND B - B		1 250 140 000 927 007 0 1

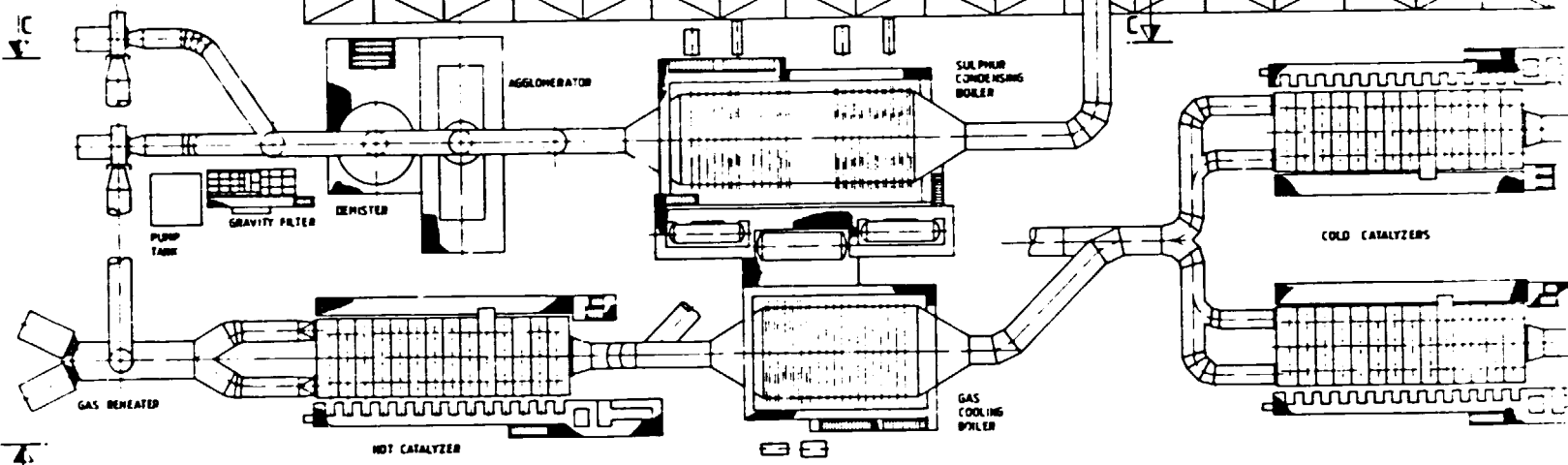
SECTION 1



LV. PRECIPITATOR

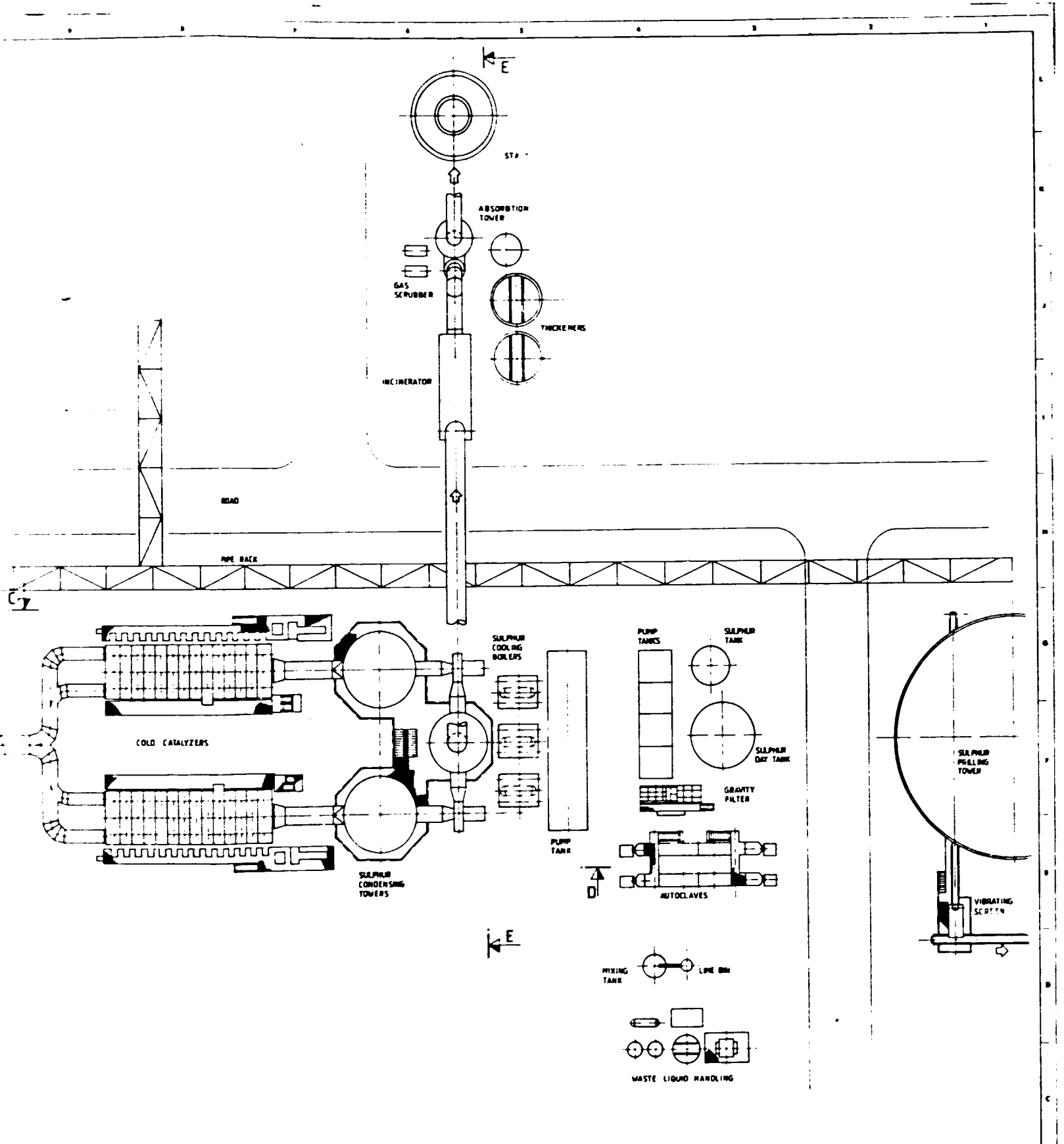
ROAD

PIPE RACK



# SECTION 1

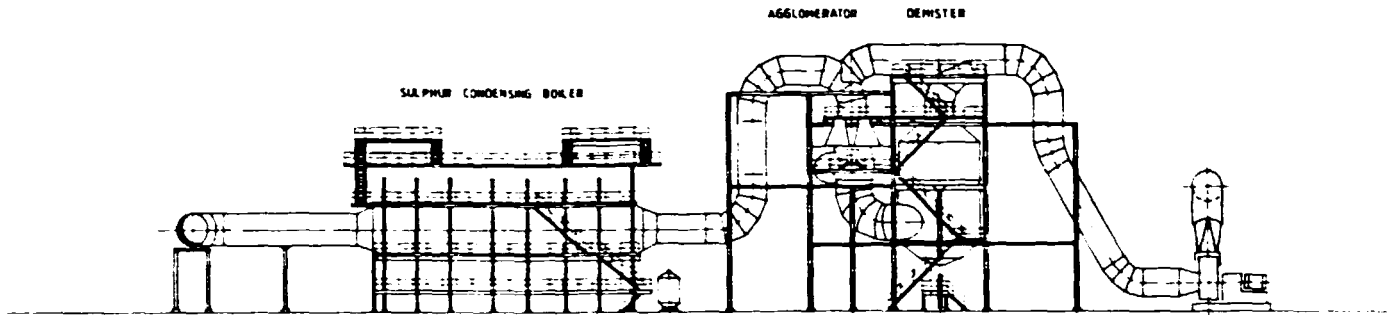
NO. 100 907 000 0	SECTIONS 1, 2, 3 AND 4	DATE	BY



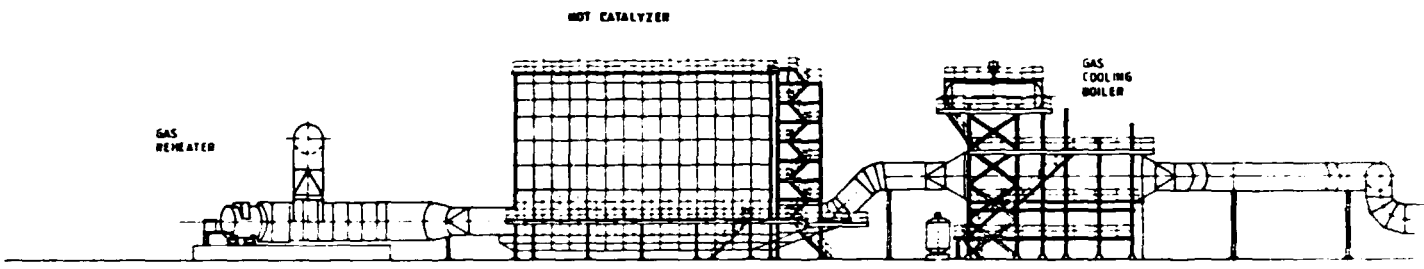
# SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	APPROVED: 5 JUNE 1986 Gw
	CHECKED:
DESIGNED:	DRAWN:
CLIENT: PYRITES PHOSPHATES & CHEMICALS LTD	PROJECT NO:
PROJECT: PPL PYRITE SHELTER	SHEET NO:
SUBJECT: SULPHUR PLANT AREA PLANT LAYOUT PLAN	SCALE: 1:200
DATE:	NO: 80 902 208 2 1

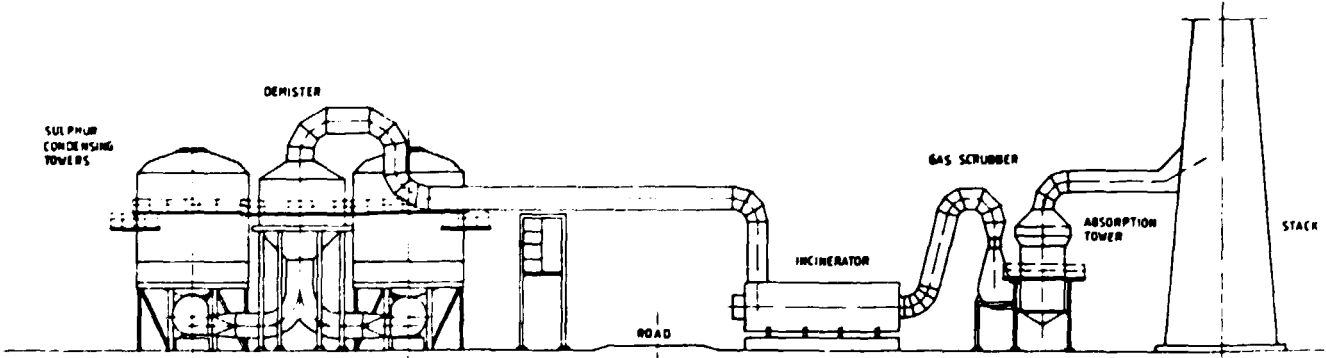
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SECTION C-C



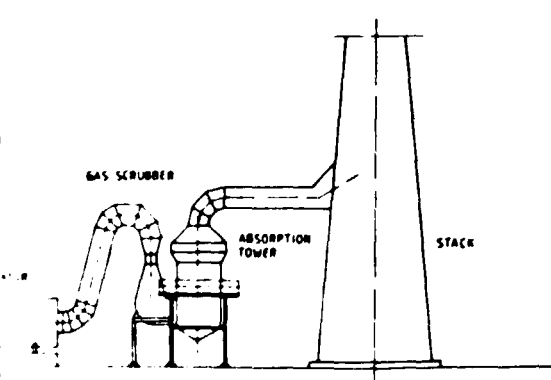
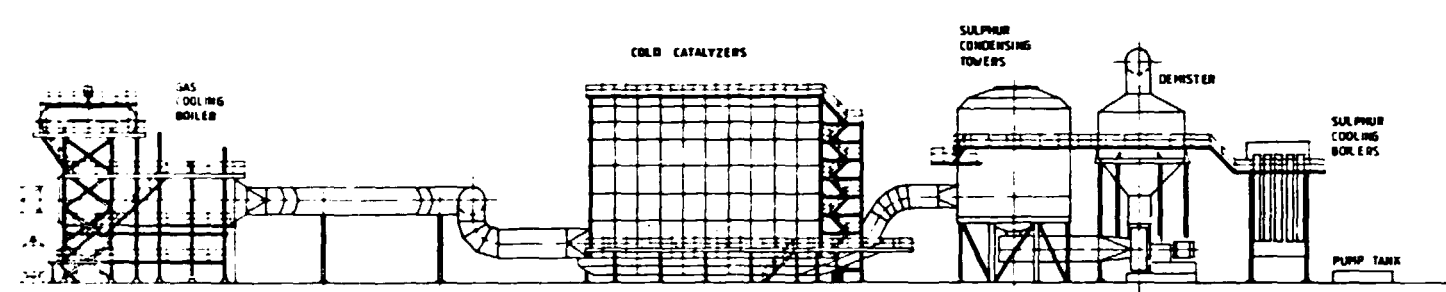
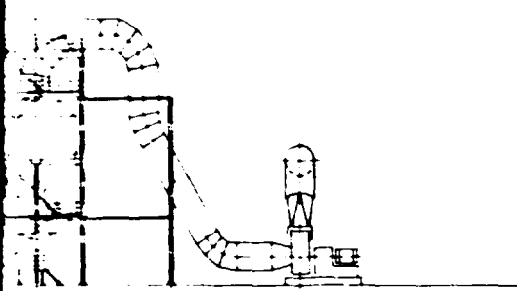
SECTION D-D



SECTION E-E

SECTION 1





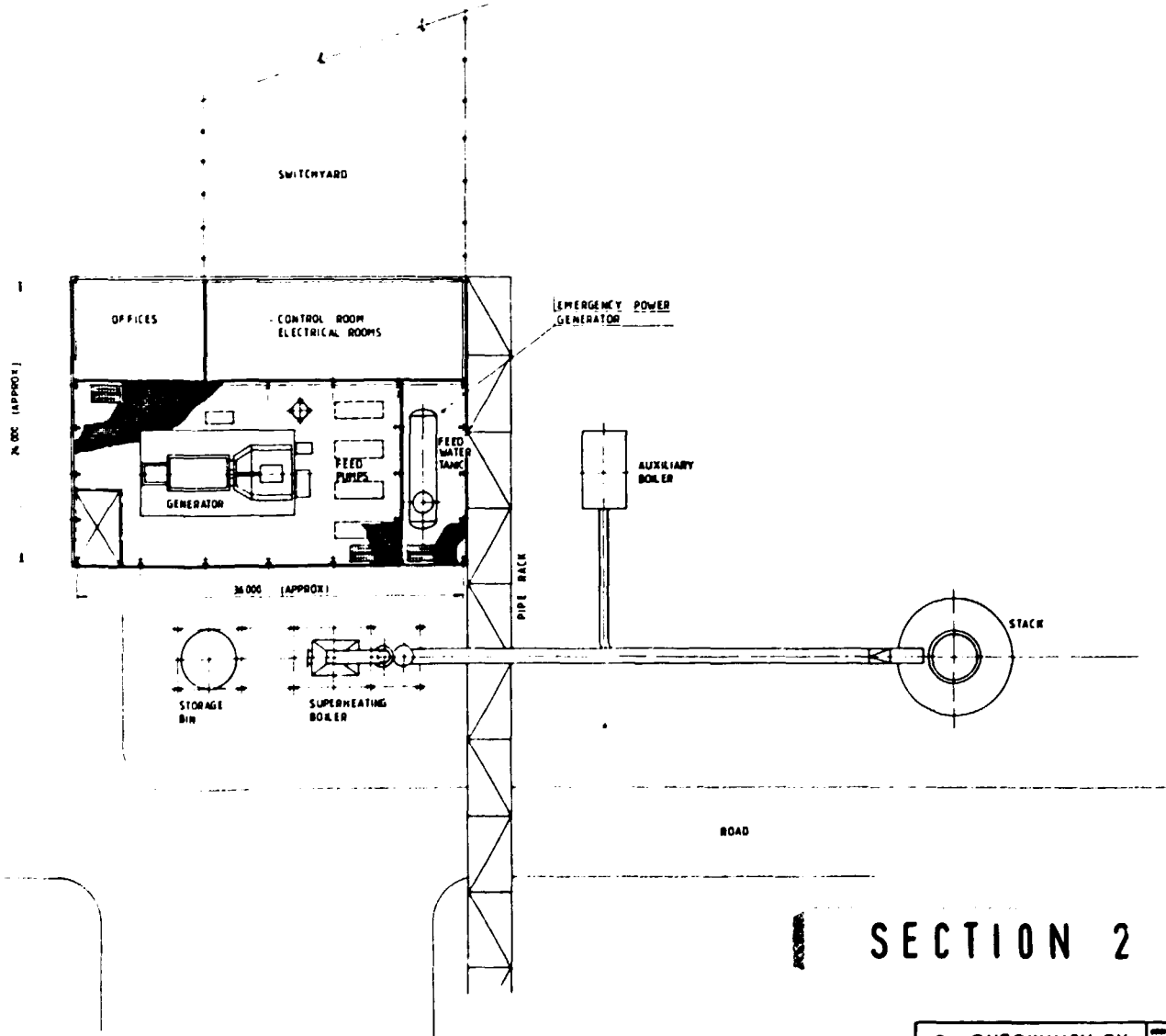
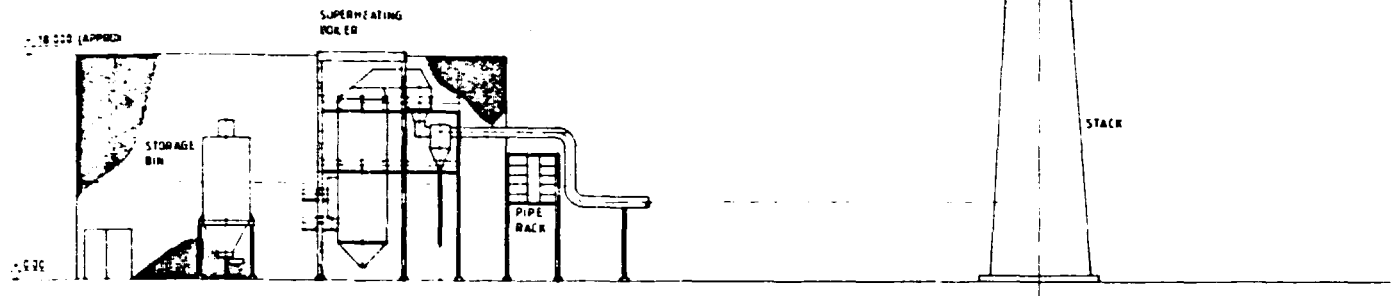
# SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	15 JUNE 1986 1:00	1:00
	PYRITES PHOSPHATES & CHEMICALS LTD	
PVEL PYRITE SHELTER		1:200
SULPHUR PLANT AREA PLANT LAYOUT SECTIONS C C D D E E	340 100 907 008 0 340 100 907 009 0	1:200

1 REVISED FOR SIVBZ 21 AUG 1985 15 JUNE 1986	2 31 AUG 1985 15 JUNE 1986	3 31 AUG 1985 15 JUNE 1986	4 31 AUG 1985 15 JUNE 1986	5 31 AUG 1985 15 JUNE 1986	6 31 AUG 1985 15 JUNE 1986	7 31 AUG 1985 15 JUNE 1986	8 31 AUG 1985 15 JUNE 1986	9 31 AUG 1985 15 JUNE 1986	10 31 AUG 1985 15 JUNE 1986
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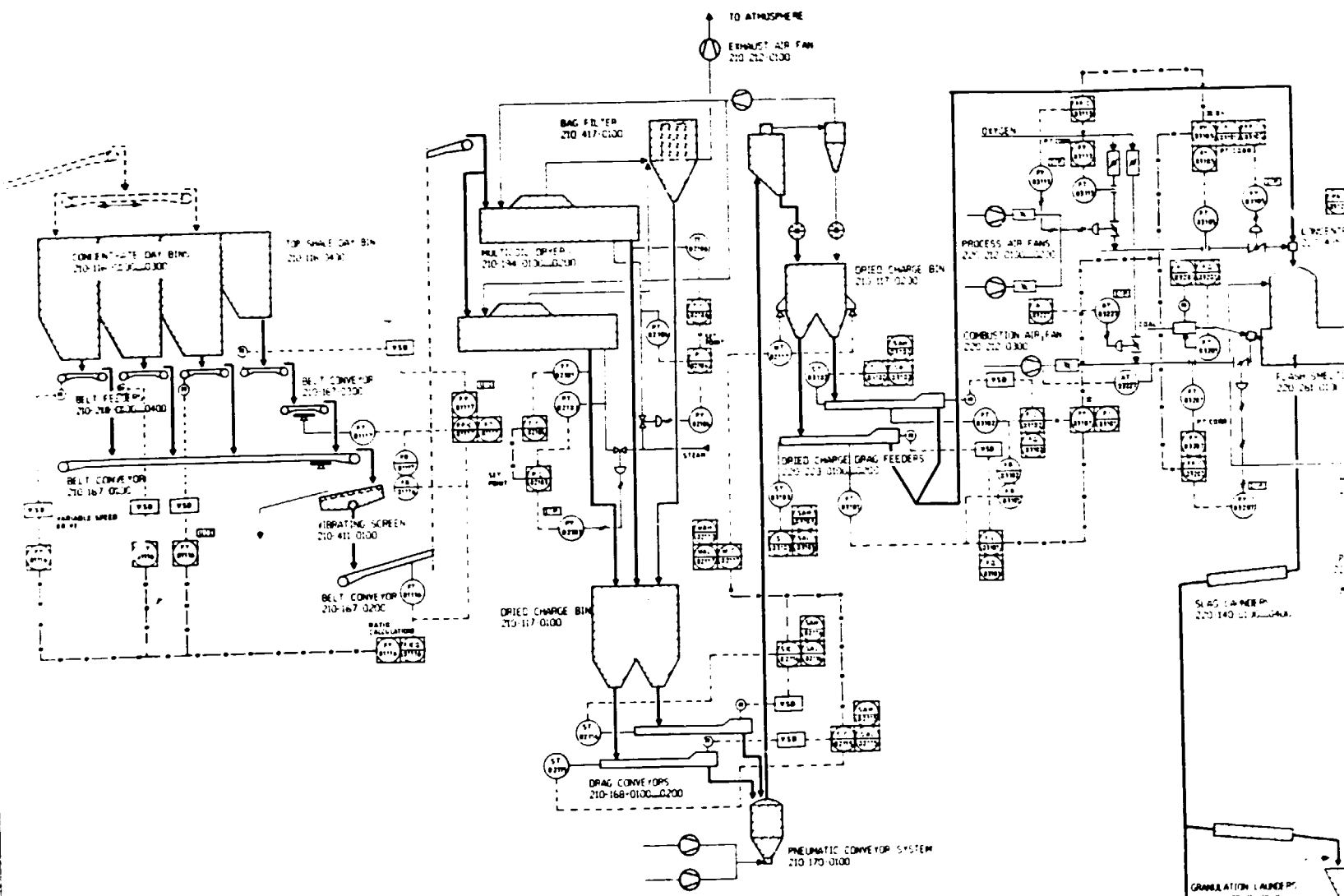


# SECTION 2

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION		DATE: 5 JULY 1984 DRAWN BY: GW
PROJECT: PYRITES, PHOSPHATES & CHEMICALS LTD		SHEET NO: 100 100 002 010 - C 1
DRAWING NO: PPL PYRITE SMELTER		SCALE: 1:200
DRAWING BY: COAL PLANT AND POWER PLANT PLAN AND SECTION		DATE: 18 NOV 1984 15 JULY 1984

NO.	DATE	BY	CHKD	DESCRIPTION
1	18 NOV 1984	TJ		REVISED
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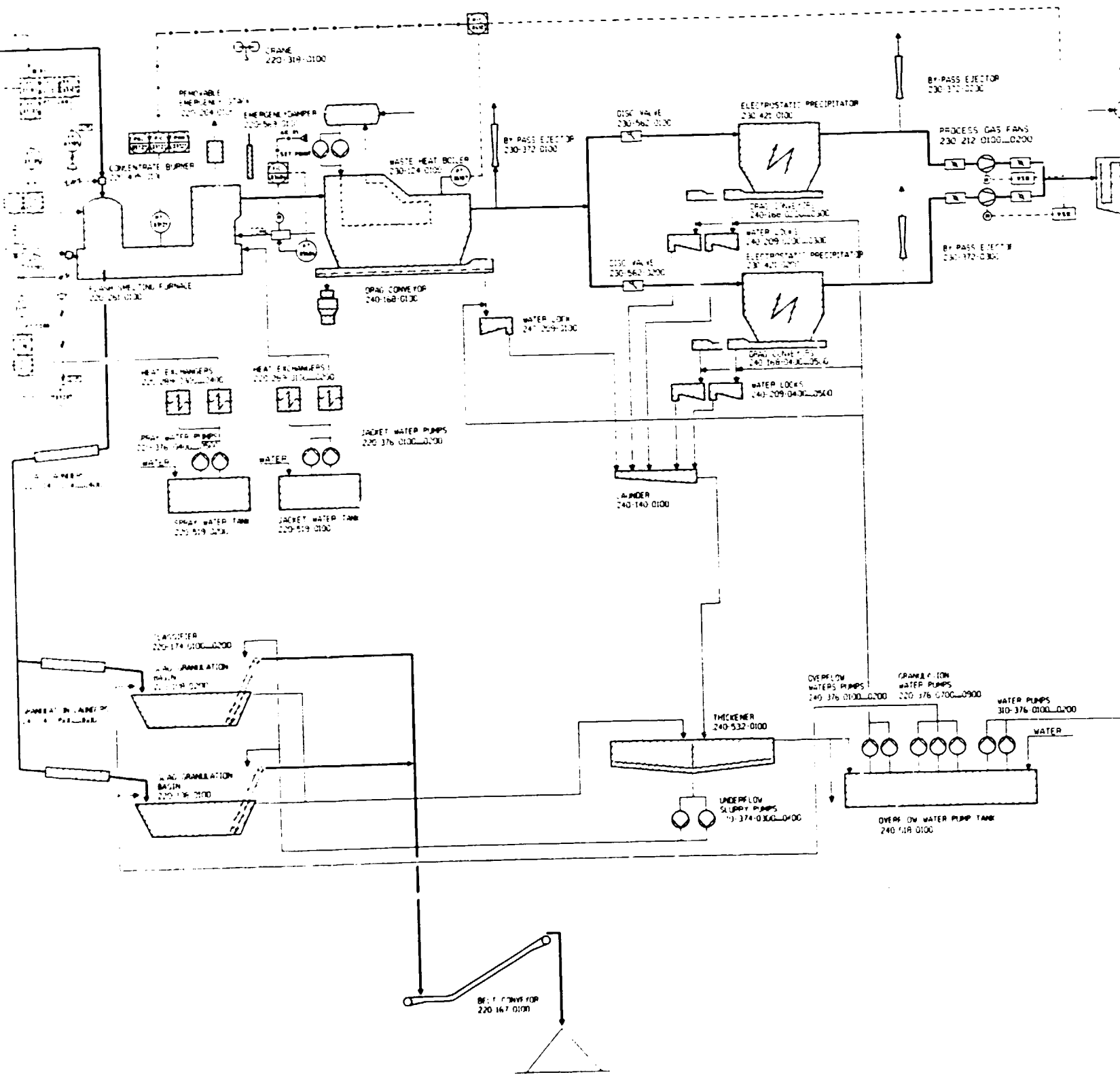
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POWER PLANT AREA  
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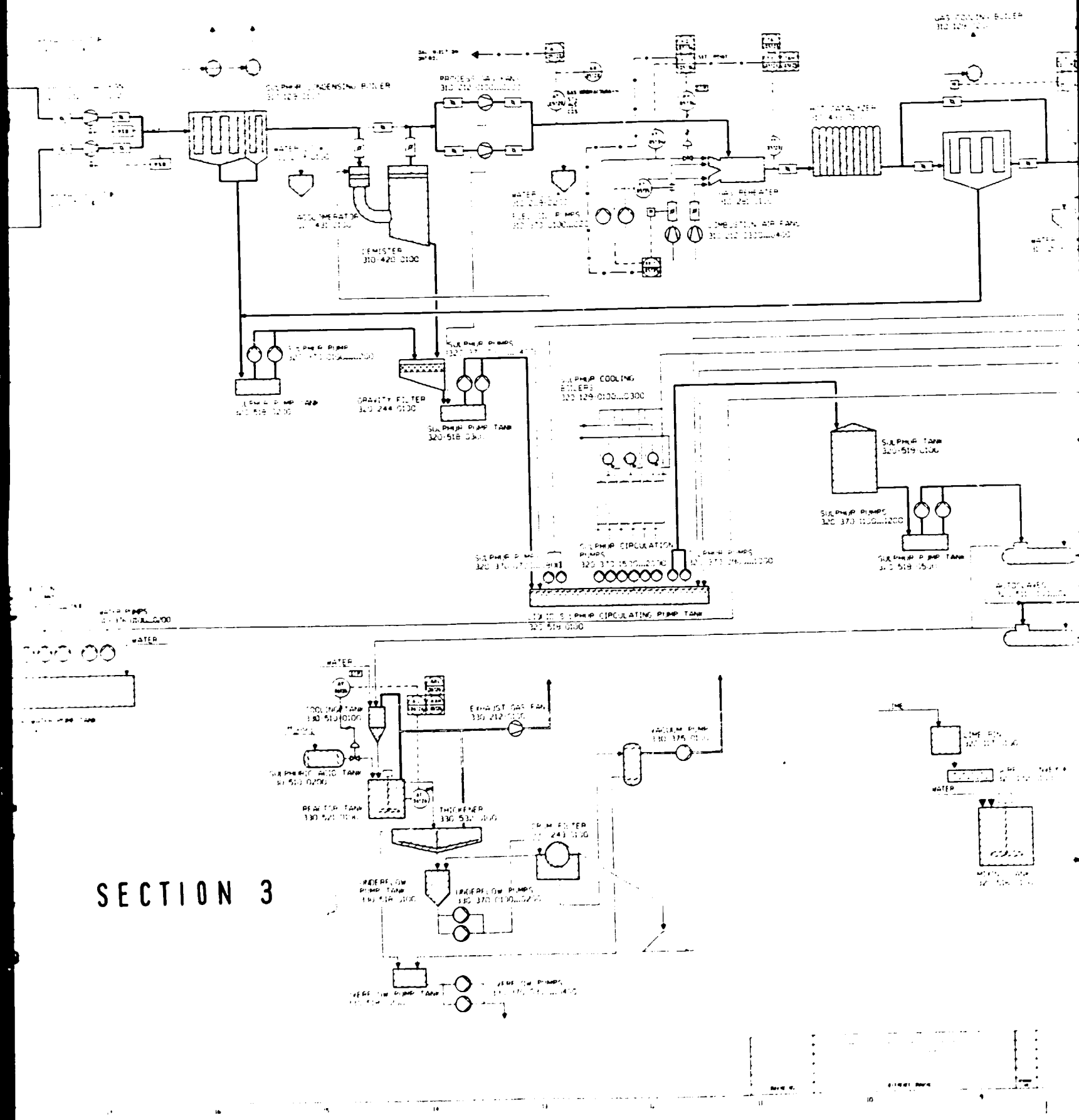
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LIME STONE SLURRY PREPARATION  
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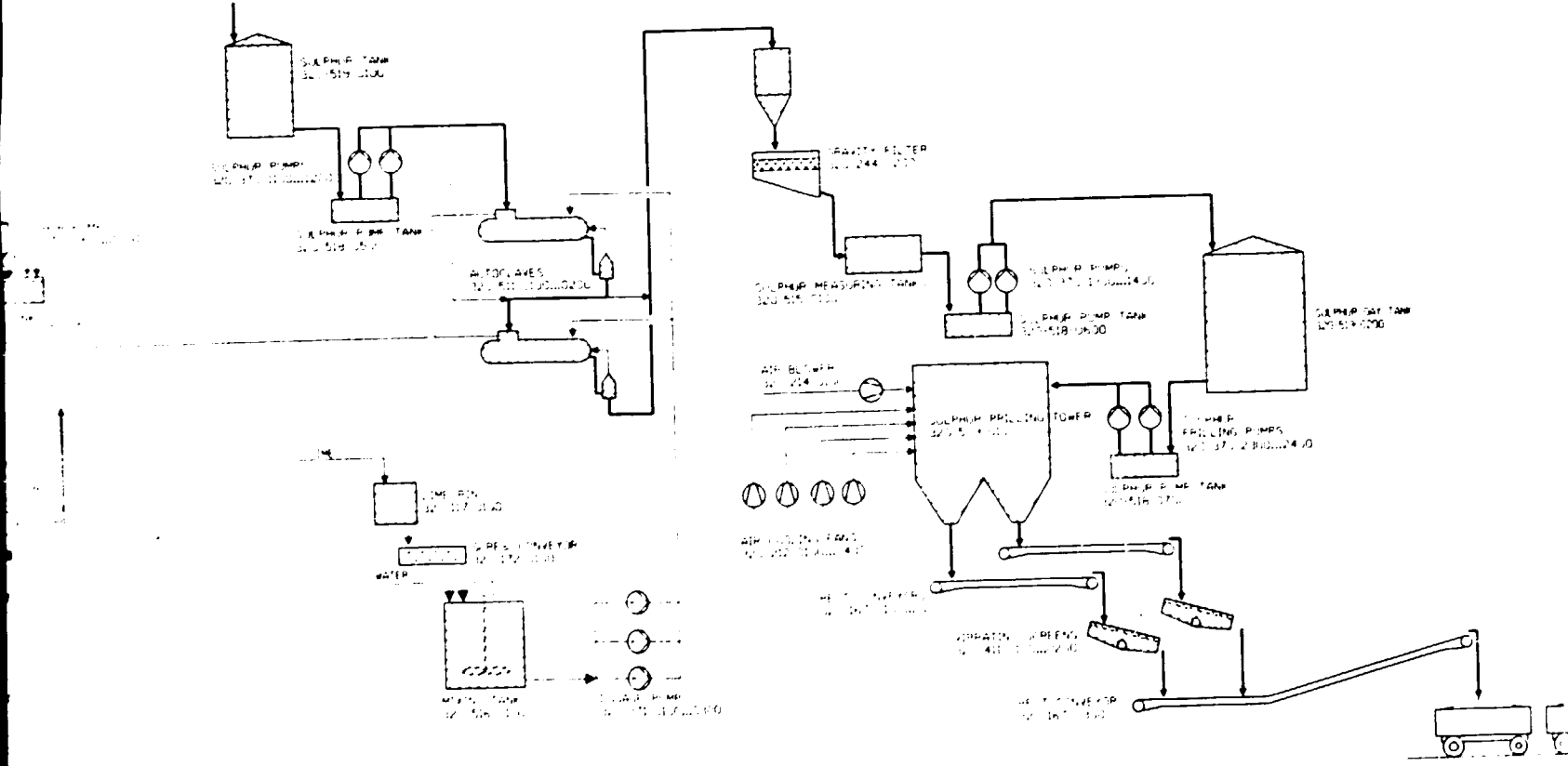
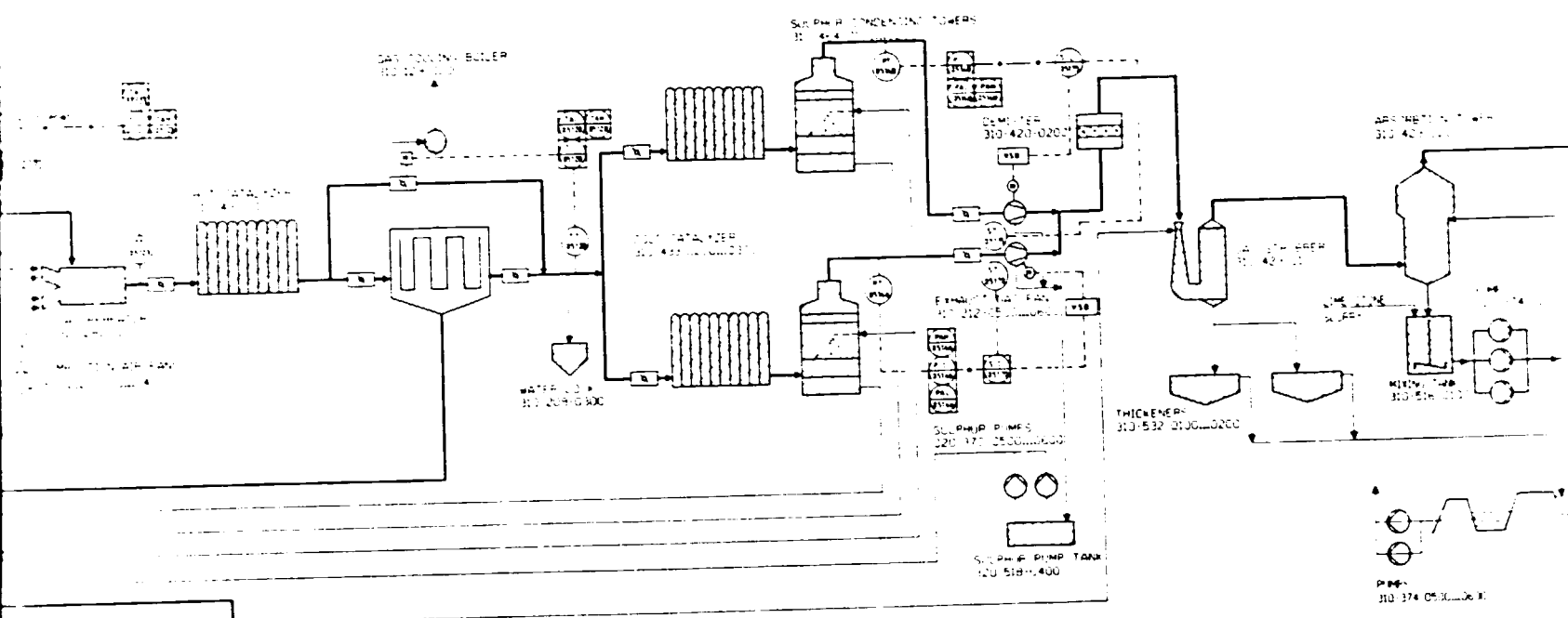
SECTION 1



SECTION 2



**SECTION 3**

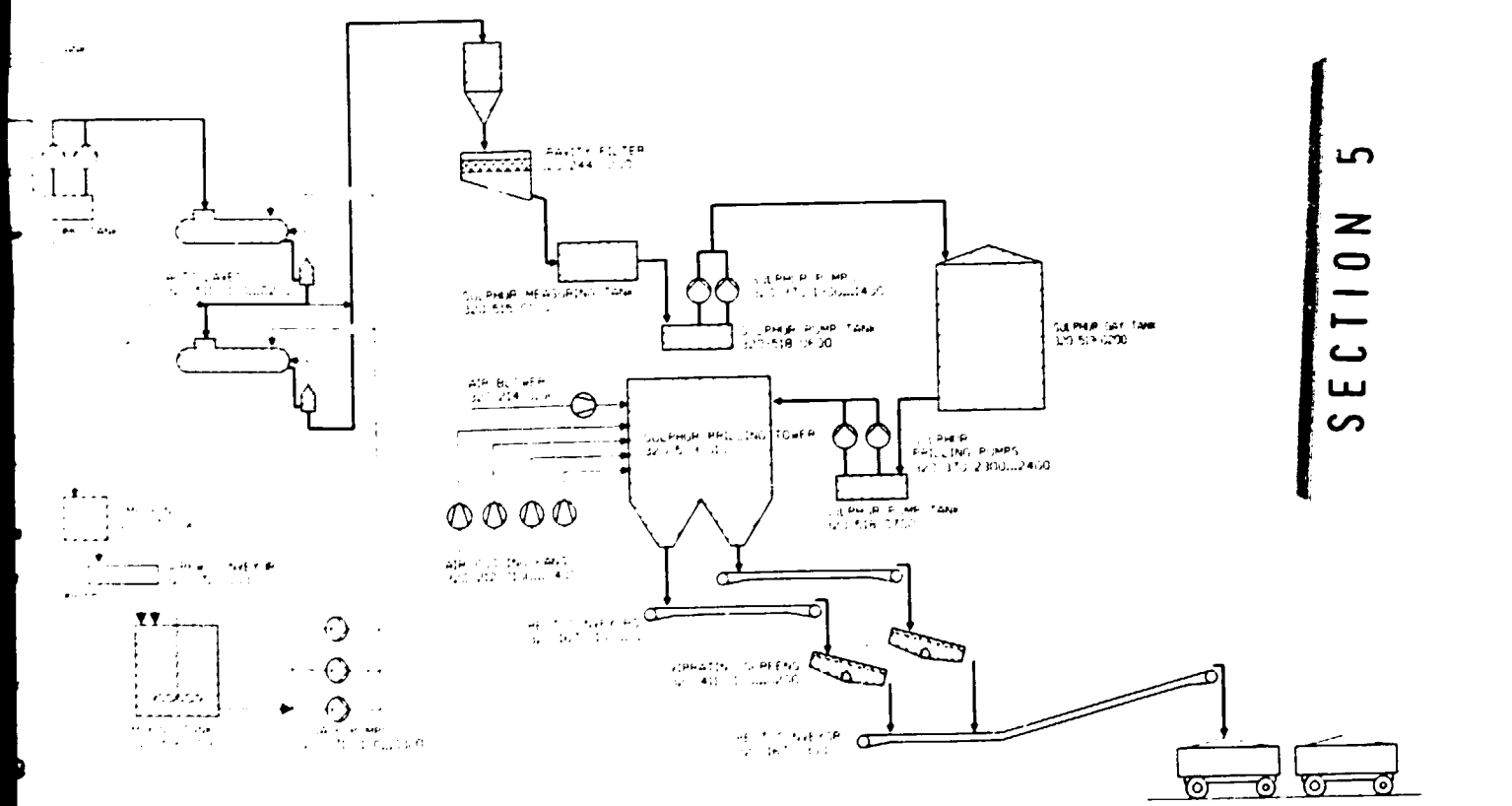
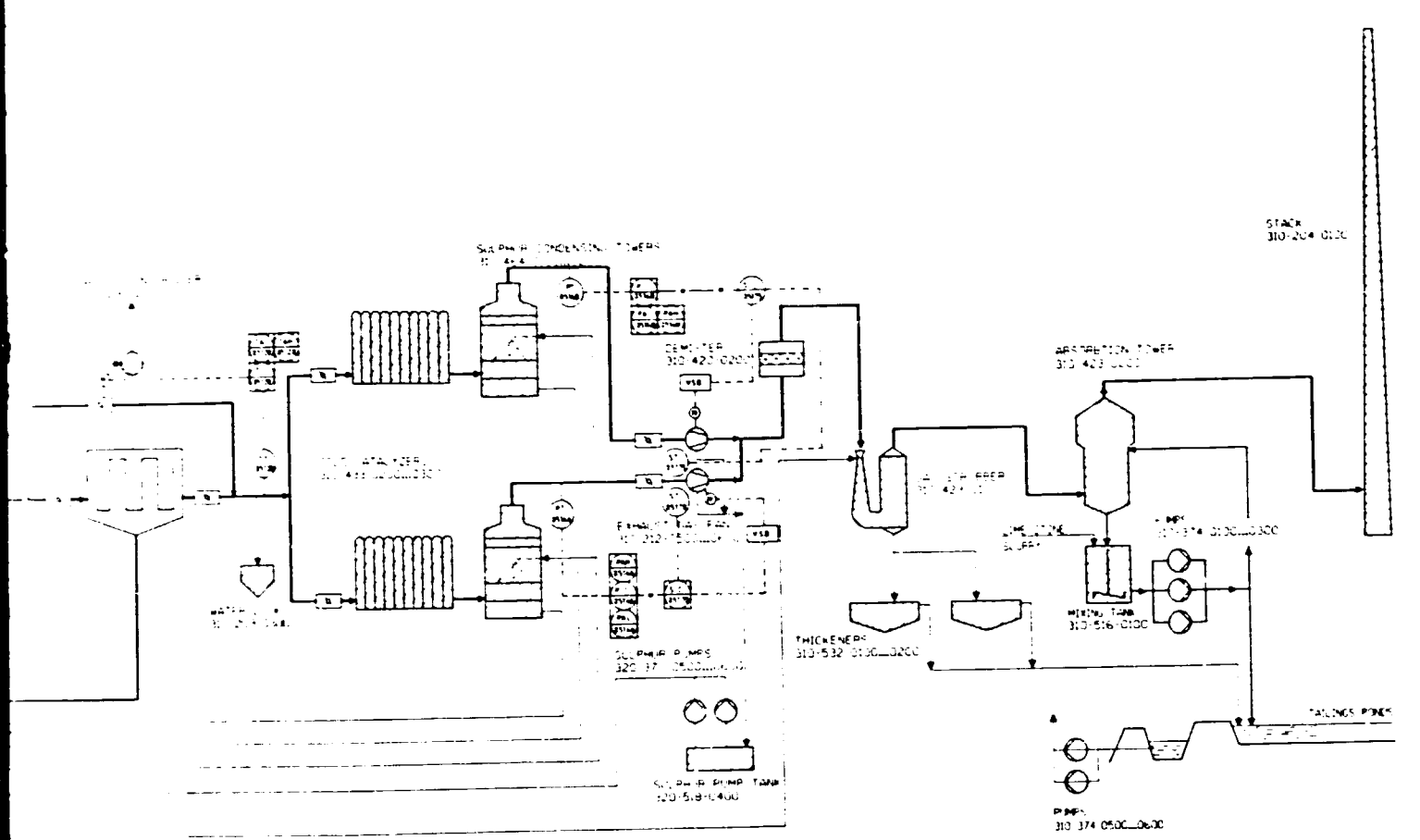


SECTION 4

**OUTOKUMPI**  
ENGINEERING

DESIGNED BY: [ ]  
DRAWN BY: [ ]  
CHECKED BY: [ ]  
DATE: 10 AUG 1988

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SECTION 5

<b>OUTOKUMPU OY</b> ENGINEERING DIVISION	REVISION NO. 10000000 DATE: 10.000.0000 DRAWN: 10.000.0000
	CHECKED: 10.000.0000 APPROVED: 10.000.0000
PROJECT: SULPHUR PLANT & METALS	SHEET NO. 5
TITLE: SULPHUR PLANT AUTOMATION	SCALE: 1:1
THE MOST IMPORTANT INSTRUMENTS	PROJECT NO. 10000000







5  
OPERATING DATA

- 5.1 Supervision and Labour Requirements
- 5.2 Requirements of Utilities and Consumables

5  
 OPERATING DATA

5.1  
 Supervision and Labour Requirements

Supervision and labour requirements for plant operation are presented below. Maintenance and laboratory personnel are not included in the evaluation because of lack of information about the local situation.

5.1.1

Total Personnel	Plant manager	1
	Engineers	6
	Foremen	27
	Crew	170
	<b>TOTAL</b>	<b>204</b>

5.1.2  
 General Supervision

	Technical manager	1
	Chief metallurgist	1
	Metallurgist	1
	<b>TOTAL</b>	<b>3</b>

5.1.3  
 Smelter and Sulphur Plant

	Day shift	Shift	TOTAL
Engineers	1		1
General foremen	1		1
Foremen	3	8	<u>11</u>
			13
Operating crew	20	68	88

5.1.4  
 Power Plant (Including Coal Plant)

	Day shift	Shift	TOTAL
Engineers	2		2
General foremen	1		1
Foremen	3	4	<u>7</u>
			10
Operating crew	8	44	52



5.1.5  
Oxygen Plant

	Day shift	Shift	TOTAL
Foremen	1		1
Operating crew	2	8	10

5.1.6  
Material Transfer (whole area)

	Day shift	Shift	TOTAL
General foreman	1		1
Foremen	1	4	<u>5</u>
			6
Crew	8	12	20

Note: Operating personnel required for offsite facilities are described in Chapter 4.7 by FEDO FACT.

5.2  
Requirement of Utilities and Consumables (7500 h/a)

5.2.1  
Flash Smelting Area

Coal	t/a	158 000
Electric energy	MWh/a	24 000
Steam 20 bar, saturated	t/a	150 000
Filtered raw water (process water)	m <sup>3</sup> /a	160 000
Deminerlized water	m <sup>3</sup> /a	30 000
Refractory bricks	t/a	300
Mortar for bricks	t/a	25
Oxygen lances	kg/a	8 000
Tapping clay	kg/a	6 000
Light fuel oil	t/a	400

5.2.2  
Sulphur Plant Area

Heavy fuel oil (Bunker C)	t/a	19 000
Electric energy	MWh/a	13 000
Steam 5.5 bar, saturated	t/a	90 000
Filtered raw water	m <sup>3</sup> /a	975 000
Lime	t/a	330
Lime stone	t/a	90 000
Sulphuric acid	t/a	400
Catalyte mass	t/a	900
Glass wool	m <sup>3</sup>	500



5.2.3  
Power Plant Area incl. Coal Plant

Operation time 7500 + 500 h/a

Coal	t/a	24 000
Heavy fuel oil	t/a	2 300
Electric energy	MWh/a	10 500
Demineralized water	m <sup>3</sup> /a	112 000
Filtered raw water	m <sup>3</sup> /a	16 000

5.2.4  
Oxygen Plant Area

Electric energy	MWh/a	66 000
Filtered raw water	m <sup>3</sup> /a	15 000



6  
ECONOMIC SURVEY

- 6.1 Estimation of investment cost
- 6.2 Estimation of operating cost
- 6.3 Estimation of revenues
- 6.4 Profitability calculations



6.  
ECONOMIC SURVEY

6.1  
ESTIMATION OF CAPITAL COST

6.1.1  
Basis of capital cost estimate

Outokumpu Oy has evaluated the investment cost of the project within the agreed scope. Additionally, in order to get a view of the overall investment and profitability, Outokumpu's estimate is supplemented with the cost of off-site facilities.

The costs of off-site facilities are estimated by FEDO.

Scope of Outokumpu's estimates

The estimates cover the cost of required process facilities within the scope of work but infrastructures such as workshop, laboratory, site works, etc. are excluded from the scope.

The following areas are included in the estimates:

- pyrite drying
- flash smelting
- flash smelting furnace gas and dust handling
- elemental sulphur line
- sulphur purification and prilling
- oxygen plant
- coal handling
- auxiliary boiler and superheater
- turbine generator plant
- boiler feed water plant
- compressed air plant



Terminal points of Outokumpu's estimates

The estimates are limited within the following terminal points

Pyrite: inlet to the dryer feed bins

Coal: inlet to the feed hopper

Bunker C oil: inlet to the day tank

Light fuel oil: inlet to the day tank

Slag and dust: outlet from belt conveyor of slag granulation

Lime: inlet to the lime feed bin

Limestone slurry: inlet to the feed pipe

Tailing of exhaust gas scrubber: outlet from the tailing pumps

Sulphur: outlet from the belt conveyors of prilling tower

Process water: inlet to the plant area

Demineralized/semisoft water: inlet to the plant area

Secondary cooling water: inlet to the plant area/  
outlet from the plant area

Electric energy: inlet/outlet at the main switchgear

Sulphuric acid: inlet to the feed tank

Tail gases: outlet from the main stack

Arsenic waste: outlet from the drum filter

Scope of FEDO's estimates

FEDO has estimated the investment of the required off-site facilities:

- Land, land development, roads and drains
- Water supply system
- Demineralized water plant
- Water softening plant
- Cooling tower system
- Fuel oil supply



- Sulhuric acid storage
- Pyrites supply
- Coal supply
- Lime stone storage and slurry preparation
- Lime storage
- Power receiving station
- Sulphur storage
- Workshop
- Wash and change rooms
- Pay loaders
- Transport vehicles
- Fire fighting equipment
- Township facilities

#### Taxes and duties

##### Supplies of indigeneous origin:

An excise duty of 12 % and a sales tax of 4 % is added to the equipment cost of indigeneous origin. The value of excise duty is calculated on the basis of "Ex Work" price before transportation cost. The sales tax is calculated after adding the excise duty to the "Ex Work" price.

The freight, insurance and erection cost as well as the cost of buildings and civil work have been free on duties and taxes.

##### Custom duty of foreign supplies

A custom duty of 40 % is added to the FOB cost of foreign equipment supplies and 25 % for the foriegn engineering and commissioning work.

#### Price level

The estimates are based on the equipment cost of the first half of the year 1985.

The foreign supplies are estimated according to the European price level, based of Outokumpu's files from prevoius projects as well as on the contacts to the equipment manufactures.

The Indian supplies are estimated according to Indian price level based on the cost estimates of FEDO and the information on unit prices received from PPCL.





When converting the foreign currencies to the Indian Rupees, the following rates of exchange have been used:

RS 1 = Finnish Marks 0.50  
RS 1 = United States Dollars 0.077  
RS 1 = Great Britain Pounds 0.064

#### Foreign/Indian supplies

The fixed capital costs are divided into foreign and Indian portions.

The division of process equipment into foreign and Indian portions was in details discussed by PPCL and Outokumpu in the meeting in April 1984. This division is shown in the equipment lists.

Concerning the other items of fixed capital, Outokumpu has made the following assumptions:

- The basic and detail engineering will be partly foreign and partly Indian.
- Commissioning, supervision and training will be partly foreign, partly Indian.
- The process piping, process gas ducting, electrification and building constructions are of Indian origin. The investment is estimated according to the Indian price level as far as there has been available information of the local unit prices.
- 30 % of instrumentation and automation is assumed to be of Indian origin and 70 % European, the price level is according to the European conditions.

#### Working capital

The working capital includes the inventories of raw material, process and products as well as accounts payable and accounts receivable inventories.

A storage of one month in average is reserved for raw materials and supplies. A production of one month is calculated for process and product inventories.

The accounts receivable have been calculated according to one months production and accounts payable according to the purchases of one month.

6.1.2  
Fixed capital. Rs 1000

Items	Basic price FOB/FOF		Freight & Insurance	Excise duty Indian suppl 12 %
	Indian Supplies	Foreign supplies		
License fee		5000		
Basic engineering	2400	20200		
Detail engineering	9600	60600		
Commissioning, supervision of erection and start up, training of staff	7500	52800		
Equipment, foreign				
-smelter		154960	7748	
-sulphur plant		64327	3216	
-power plant and coal treatment		64363	3218	
-oxygen plant		124000	6200	
Equipment, Indian				
-air and gas ducting	16630		931	19
-others	175703		9839	210
Electrification	27788		1556	33
Piping and ducting	70000		3920	84
Instrumentation and automation	6706	22563	1504	80
Spare parts	12751	21059	1691	15
Erection and installation	104337			
Building constructions	46454			
Subtotal	479869	589872	39824	371
Miscellaneous, 5 %	23993	29494	1991	18
TOTAL COST INSIDE OUTOKUMPU'S SCOPE	503863	619366	41815	390
OFF SITE FACILITIES, TURN KEY	99324 (incl. freight)			58
OVERALL INVESTMENT	603187	619366	41815	448
Overall investment without duties and taxes	603187	619366	41815	

SECTION 1

Freight & Insurance	Taxes and duties			Cost at site		Total	
	Excise duty for Indian supplies 12 %	Custom duty for foreign supplies 45 % (25%)	Sales tax of Indian supplies 4 %	Indian supplies	foreign supplies		
000		1250		1250	5000	6250	
200		5050	96	7546	20200	27746	
600		15150	384	25134	60600	85734	
800		13200	300	21000	52800	73800	
960	7748	69732		77480	154960	232440	
327	3216	28947		32164	64327	96491	
363	3218	28963		32182	64363	96545	
1000	6200	55800		62000	124000	186000	
	931	1936	745	20302		20302	
	9839	21084	7871	214498		214498	
	1556	3335	1245	33924		33924	
	3920	8400	3136	85456		85456	
563	1504	805	10153	300	19468	22563	42031
059	1691	1530	9477	571	26020	21059	47080
					104337		104337
					46454		46454
872	39824	37149	237723	14649	809214	589872	1399086
494	1991	1857	11886	732	40461	29494	69954
366	41815	39007	249609	15382	849675	619366	1469041
freight)		5826		2106	107256		107256
366	41815	44833	249609	17488	956931	619366	1576297
366	41815				603187	661181	1264368

SECTION 2



6.1.3  
Working capital

Inventories:	
- Pyrite storage, one month, 52,000 t	Rs 18,200,000
- Supplies, one month	Rs 12,451,000
- Process and product inventories, variable operating cost of one month	Rs 31,774,000
Accounts receivable, sales of one month	Rs 51,934,000
./.Accounts payable, operating cost of one month without wages and salaries	<u>Rs 34,958,000</u>
Total working capital	Rs 79,400,000 =====

6.1.4  
Annual breakdown of the investment cost

The investment is annually divided into project years assuming that the implementation time will be four years.

Project Years	Fixed capital Rs 1000	Working capital Rs 1000
1	102,157	
2	322,710	
3	740,384	
4	364,314	
5	46,733	37,548
6	-	39,814
7	-	2,038
Total	<u>1,576,298</u>	79,400

The breakdown of annual investment cost is shown in the table on the next page.

## ANNUAL BREAK DOWN OF INVESTMENT COST Rs 1000

	YEARS	1	2	3	4	5	TOTAL
Licence fee		6250					6250
Basic engineering		27746					27746
Detail engineering		42867	42867				85734
Commissioning, supervision of erection and start up, training of staff			1476	18450	29520	24354	73800
Equipment, foreign							
-smelter		58110	134815	34866	4649		232440
-sulphur plant		24123	55965	14474	1930		96491
-power plant and coal treatment		24136	55996	14482	1931		96545
-oxygen plant		46500	107880	27900	3720		186000
Equipment, Indian							
-air and gas ducting			5076	11775	3045	406	20302
-others			53625	124409	32175	4290	214498
Electrification			3392	23747	6106	678	33924
Piping and ducting			8546	59819	15382	1709	85456
Instrumentation and automation			4203	29422	7566	941	42031
Spare parts					47080		47080
Erection and installation				31301	73036		104337
Building constructions			4545	20904	20904		46454
Subtotal		76863	276699	674483	326536	44508	1399088
Miscellaneous, 5 A		3843	13835	33724	16327	2225	69954
<b>TOTAL COST INSIDE OUTOKUMPU'S SCOPE</b>		<b>80706</b>	<b>290533</b>	<b>708207</b>	<b>342862</b>	<b>46733</b>	<b>1469042</b>
OFF-SITE FACILITIES, TURN KEY		21451	32177	32177	21451		107256
<b>OVERALL INVESTMET</b>		<b>102157</b>	<b>322710</b>	<b>740384</b>	<b>364314</b>	<b>46733</b>	<b>1576298</b>
<b>OVERALL INVESTMENT WITHOUT DUTIES AND TAXES</b>		<b>85700</b>	<b>252543</b>	<b>583320</b>	<b>305842</b>	<b>36963</b>	<b>1264368</b>



6.1.5  
Financing of the investment

The financing plan is based on the discussions with the representatives of PPCL.

The initial investment will be financed with long term loan and equity. The other financing, required to balance the cash flow, will be supplied with short term loans.

The interests of the construction period as well as the 25 % of working capital will be calculated to the initial investment.

The portions of equity/long term loans will be 50 %/50 %. The equity will be paid totally first before drawing the loan.

The interest of the long term loans will be 13 % per annum, grace period two years and pay back time ten years.

The interest of short term loans will be 17.5 %.

It is assumed that the payment of the pay back and interests of long term loans will be at the end of the year.

The annual financing schedule is shown on the next page.

FINANCING PLAN, Rs 1000

Year	1	2	3	4	5	Total
Investment cost without interests	102157	322710	740384	364314	46733	1576298
25% of working capital					19850	19850
Interests of long term loan @ 13	0	0	22221	72858	* * * *	95079
<b>Total investment to be financed with equity/long term loan</b>	<b>102157</b>	<b>322710</b>	<b>762605</b>	<b>437172</b>	<b>66583</b>	<b>1691227</b>
Long term loans						
-drawing	0	0	341859	437172	66583	845613
-cumulative	0	0	341859	779030	845613	845613
Equity requirement	102157	322710	420746	0	0	845613



## 6.2

## ESTIMATION OF OPERATING COST

## 6.2.1

## Basis of operating cost estimates

## Scope and extent of estimates:

The operating cost are estimated according to the same scope and within the same terminal points as the investment cost (item 6.1.1).

Additionally, the operating cost of off-site facilities are separately estimated by FEDO.

The consumption figures of utilities and supplies are based on the process and plant design. The estimation of the amount of operating personnel as well as maintenance cost is based on the experience from Outokumpu's Kokkola pyrite smelter.

A miscellaneous cost of 5 % is estimated to cover the unspecified operating cost such as administration, purchasing, insurances and miscellaneous supplies.

## Unit prices used in the estimates

The unit prices are partly based on the information received from PPCL partly on the European conditions.

## - Wages and salaries including social cost:

- managers	Rs	3,000 /month
- operating engineers	"	2,500 / "
- foremen	"	2,500 / "
- skilled labour	"	1,800 / "
- helpers	"	1,200 / "
- Buncer C oil	Rs	3,141 /ton
- light fuel oil	"	3,500 / "
- coal	"	250 / "
- lime	"	600 / "
- limestone	"	30 / "
- refractory bricks	"	8,000 / "
- mortar for bricks	"	6,000 / "
- cast refractory	"	6,000 / "
- oxygen lances for tapping	"	10 / kg
- tapping clay	"	2,000 / ton





- sulphuric acid	"	1,500 /	"
- glass wool	"	700 /	m <sup>3</sup>
- fresh water	"	- /	"
- cooling water	"	- /	"
- catalyze mass	"	5,500 /	"

The water supply cost is included in the power, chemicals etc. costs.

6.2.2

Raw materials

The transfer price of pyrite (sulphur content 38 %) is Rs 350/ton.

No transfer price has been used for top shale.

Total pyrite feed per annum will be 625,000 tons which corresponds to an annual cost of Rs 218,750,000.

6.2.3

Annual operating cost

6.2.3.1

Variable cost

Raw materials

Rs 218,750,000

Utilities and supplies

Smelter:

	Annual consumption	Unit Price Rs	Annual cost Rs 1000/a
*Coal	158,000 t	250	39,500
*Electric energy	24,000 MWh produced in the power plant		
*Refractory bricks	300 t	8000	2,400
*Mortar for bricks	25 t	6000	150
*Oxygen lances	8,000 t	5	40
*Tapping clay	6,000 t	2	12
*Light fuel oil	400 t	3500	1,400



	Annual consumption	Unit Price	Annual cost Rs 1000/a
<b>Sulphur plant:</b>			
*Heavy fuel oil (Bunker C)	19,000	3141	59,679
*Electric energy	13,000 MWh produced in the power plant		
*Lime	330 t	600	198
*Lime stone	90,000 t	30	2,700
*Sulphuric acid	400 t	1500	360
*Catalyte mass	900 m <sup>3</sup>	5500	4,950
*Glass wool	500 m <sup>3</sup>	700	350

**Power plant and coal treatment:**

*Coal	24,000 t	250	30,000
*Heavy fuel oil	2,300 t	3141	7,224
* Electric energy	10,500 MWh produced in the power plant		

**Oxygen plant:**

*Electric energy	66,000 MWh produced in the power plant		
------------------	--	--	--

**Off-site facilities:**

*Slag/dust dumping	.583,500 t	.10	5,835
*Electric energy	17,250 MWh produced in the power plant		

Subtotal of utilities and supplies	Rs 154,798,000/a
Miscellaneous 5 %	7,740,000/a
<b>Total utilities and supplies</b>	<b>Rs 162,538,000/a</b>

<b>Total variable operating costs</b>	<b>Rs 381,288,000/a</b>
	=====

**6.2.3.2**

**Fixed operating cost**

Rs 1000/a

**Wages and salaries, main plant**

- plant manager (1)	(Rs 3000/month)	36
- engineers (6)	(" 2500 " )	180
- foremen (27)	(" 2500 " )	810
- operating crew (170)	(" 1800 " )	3,672

**Wages and salaries, off-site**

- operating crew (76)	(Rs 1800/month)	1,642
-----------------------	-----------------	-------

**Wages and salaries, maintenance**

- foremen (10)	(Rs 2500/month)	300
- skilled workers (51)	(" 1800 " )	1,102
- helpers (48)	(" 1200 " )	<u>691</u>

<b>Total wages and salaries</b>	<b>8,443</b>
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Spare parts and maintenance materials	36,000
	-----
subtotal	44,443
General and miscellaneous cost 5%	2,221
Total fixed operating cost	Rs 46,654,000/a
	=====

Variable operating cost with different capacities:

In the cash flow calculation the production rate of the first operating year is assumed to be 50 %. Also a cash flow with a capacity of 90 % is calculated.

The consumption of utilities does not directly follow the capacity rate. It is estimated that with a capacity of 50 % the utility cost will be 65 % of the cost of full production and with a capacity of 90 % the cost will be 93 % respectively.



6.3  
ESTIMATION OF REVENUES

Elemental sulphur and electric energy will be the products for sale.

Rs 2573 per ton has been the basic price of sulphur in the profitability calculations.

With the nominal capacity the electric power generation will be 7.5 MW higher than the consumption and this share is assumed to be sold. A price of Rs 650/MWh is used as a sales price of electric energy.

The sales revenues with the nominal capacity:

\*Sulphur 228,000 t/a, Rs 2573/t, Rs 586,644,000/a

\*El.energy 56,250 MWh/a, Rs 650/MWh, Rs 36,562,500/a

Total revenues Rs 623,206,500/a



6.4  
Profitability calculations

6.4.1  
General

The Internal Rate of Return of cash flow and equity as well as the pay back period has been used as a character of profitability.

In the estimation of annual cash flow the following bases have been used:

Income taxes:

No income taxes have been considered.

Calculation period:

Construction period:	4 years
Operational period	<u>15 years</u> 19 years

Start-up of production:

The production rate of the first operating year will be 50 %.

Salvage value of the investment:

5 % of fixed capital

Financing expenses:

The financing terms are as specified in item 6.1.5.

Calculation of pay back period:

The pay back period is calculated with a simplified method of dividing the total investment with the annual profit. The profit is sales revenues minus operating expenses and average interests of loans.

The profitability is calculated for four cases:

- Case\_1: The plant will operate with the nominal capacity (after the fifth project year) and the costs and revenues are as shown in items 6.1-6.3.
- Case\_2: As case 1., but the production rate will be 90 %.
- Case\_3: The revenues are estimated with such a sulphur price that the internal rate of return of cash flow will result in 12 %.
- Case\_4: Calculation of "economic IRR". The investment and operating costs are without duties and taxes. It has been assumed, that the transfer price of pyrite as well as the other operating costs (excluding wages and salaries) contains 5 % different taxes.



6.4.2

Annual cash flow, internal rate of return and pay back period

The cash flows, presented in appendices 6.1-6.4, give the following results:

	IRR of cash flow	IRR of equity	Pay back period
Case 1.	6.5 %	1.1 %	13.3 years
Case 2.	4.7 %	negative	48.5 years
Case 3.	12.0 %	10.8 %	6.4 years
Case 4.	10.5 %	8.8 %	7.2 years

In case 4. the IRR of cash flow of 12 % is resulted with a sulphur price of Rs 3,010.40 per ton.

6.4.3

Sensitivity analysis

The sensitivity analysis regarding the most important project variables indicates the following internal rate of return of cash flow:

	IRR of cash flow	IRR of equity
<u>Fixed investment:</u>		
Rs 1,000,000,000	12.1 %	11.2 %
Rs 1,250,000,000	9.3 %	7.0 %
Rs 1,566,347,000	6.5 %	1.1 %
Rs 1,750,000,000	5.2 %	-8.3 %
Rs 2,000,000,000	3.7 %	negative



	IRR of cash flow	IRR of equity
<u>Price of sulphur:</u>		
Rs 2,573 per ton	6.5 %	1.1 %
" 2,600 "	6.9 %	2.4 %
" 2,700 "	8.3 %	5.3 %
" 2,800 "	9.6 %	7.4 %
" 2,900 "	10.8 %	8.8 %
" 3,000 "	11.9 %	10.8 %
" 3,100 "	13.0 %	12.4 %
" 3,200 "	14.1 %	13.8 %
" 3,300 "	15.2 %	15.2 %
" 3,400 "	16.1 %	16.5 %
" 3,500 "	17.1 %	17.8 %
<u>Total operating cost:</u> (including pyrite)		
Rs 350,000,000 /a	11.4 %	10.2 %
Rs 400,000,000 /a	8.2 %	5.3 %
Rs 427,942,000 /a	6.5 %	1.1 %
Rs 445,000,000 /a	5.4 %	-6.9 %

The results of the sensitivity analysis are graphically presented in appendices 6.5-6.7

## PROJECT CASH FLOW, Rs 1000

Price of sulphur Rs 2,575 per ton

Production capacity 50 % during the 5th year and 100 % later

Year	1	2	3	4	5	6
Net revenue					287160	598764
Variable operating cost					215025	381283
Change in product inventories					17919	13855
Fixed operating cost					46651	46651
Gross margin	0	0	0	0	13400	184677
Working capital					37548	39813
Investment cost without interests	102157	322710	740384	361314	46733	
Annual cash flow before financing cost	102157	322710	740384	361314	40881	144864
Long term loans						
drawing	0	0	341859	437172	66583	
cumulative (end of year)	0	0	341859	779031	761053	676491
pay back					84561	84561
interest % 13	0	0	22221	72858	105602	98937
Short term loans						
change	0	0	0	0	180232	76904
cumulative (end of year)	0	0	0	0	180231	257135
interest % 17.5	0	0	0	0	15770	38270
Equity requirements	102157	322710	420746	0		
Available for share holders	-102157	322710	-420746	0	0	0

INTERNAL RATE OF RETURN OF CASH FLOW (BEFORE FINANCING)  
INTERNAL RATE OF RETURN OF EQUITY 1.1%

NET PROFIT FOR CALCULATION OF PAY BACK TIME:

Sales revenue per annum 623207  
Production cost per annum 427942  
Average interest per annum 76354

118911

## SECTION 1

PAY BACK TIME 13.3 YEARS FROM THE START UP



ton

at the 5th year and 100 % later on

	4	5	6	7	8	9	10	11	12	13
	287160	598764	623207	623207	623207	623207	623207	623207	623207	623207
	215025	381288	381288	381288	381288	381288	381288	381288	381288	381288
	17919	13855								
	46651	46654	46654	46654	46654	46654	46654	46654	46654	46654
0	13400	184677	195265	195265	195265	195265	195265	195265	195265	195265
	37548	39813	2037							
1	361314	46733								
1	361314	40881	144864	193228	195265	195265	195265	195265	195265	195265
0	437172	66583								
0	779031	761053	676491	591930	507368	422807	338246	253684	169123	84561
		84561	84561	84561	84561	84561	84561	84561	84561	84561
1	72858	105602	98937	87944	76951	65958	54965	43972	32979	21986
	0	180232	75904	26604	17426	8721	1653	14017	28753	46311
	0	180231	257135	283739	301165	309886	308233	294215	265463	219149
	0	15770	38270	47326	51179	53467	54085	52714	48972	12403
	0									
	0	0	0	0	0	0	0	0	0	0

OF CASH FLOW (BEFORE FINANCING EXPENSES) 6.5%  
 OF EQUITY 1.1%

PERCENTAGE OF PAY BACK TIME:  
 per annum 623207  
 per annum 427942  
 per annum 76354

**SECTION 2**

118911

YEARS FROM THE START UP

10	11	12	13	14	15	16	17	18	
623207	623207	623207	623207	623207	623207	623207	623207	623207	6710
381288	381288	381288	381288	381288	381288	381288	381288	381288	3470
46654	46654	46654	46654	46654	46654	46654	46654	46654	4000
195265	195265	195265	195265	195265	195265	195265	195265	195265	2120
195265	195265	195265	195265	195265	195265	195265	195265	195265	7000
338246	253684	169123	84561	0					
84561	84561	84561	84561	84561					
54965	43972	32979	21986	10993	0	0	0	0	
1653	14017	-28753	-46314	-67243	-165197				
308233	294215	265463	219149	151905	0				
54085	52714	48972	42403	32467	13292				
0	0	0	0	0	30068	195265	195265	195265	37500

**SECTION 3**

PROJECT CASH FLOW, Rs 1000

Price of sulphur Rs 2,575 per ton

Production capacity 50 % during the 5th year and 90 % later

Year	1	2	3	4	5	6
Net revenue					287160	541333
Variable operating cost					215025	348033
Change in product inventories					17919	11083
Fixed operating cost					46654	46654
Gross margin	0	0	0	0	43400	157723
Working capital					37548	32254
Investment cost without interests	102157	322710	740384	364314	46733	
Annual cash flow before financing cost	102157	-322710	-740384	-364314	-40881	125470
Long term loans						
drawing	0	0	341859	437172	66583	
-cumulative (end of year)	0	0	341859	779031	761053	676491
pay back					84561	84561
-interest           % 13	0	0	22221	72858	105602	98937
Short term loans						
change	0	0	0	0	180232	98157
-cumulative (end of year)	0	0	0	0	180231	278388
-interest           % 17.5	0	0	0	0	15770	40123
Equity requirements	102157	322710	420746	0		
Available for share holders	-102157	-322710	-420746	0	0	

INTERNAL RATE OF RETURN OF CASH FLOW (BEFORE FINANCING)  
INTERNAL RATE OF RETURN OF EQUITY NEGATIVE

NET PROFIT FOR CALCULATION OF PAY BACK TIME:  
-Sales revenue per annum       560886  
-Production cost per annum     394689  
-Average interest per annum   133724

32473

**SECTION 1**

PAY BACK TIME           48.5 YEARS FROM THE START UP

A P P E N D I X 6-2

the 5th year and 90 % later on

	4	5	6	7	8	9	10	11	12	13	
		287160	541331	560886	560886	560886	560886	560886	560886	560886	
		215025	348035	348035	348035	348035	348035	348035	348035	348035	
		17919	11084								
		46654	46654	46654	46654	46654	46654	46654	46654	46654	
		-----			-----			-----			-----
0	43400	157726	166197		166197	166197	166197	166197	166197	166197	
	37548	32256	1630								
364314	46733										
	-----			-----			-----			-----	
364314	-40881	125470	164567		166197	166197	166197	166197	166197	166197	
137172	66583				507368	422807	338246	253684	169123	84561	
779031	761053	676491	591930		84561	84561	84561	84561	84561	84561	
	84561	84561	84561		76951	65958	54965	43972	32979	21980	
72858	105602	98937	87944								
0	180232	98157	62089		60163	59654	59048	58325	57463	56430	
0	180231	278389	340478		400641	460295	519343	577667	635130	691567	
0	15770	40129	54151		64848	75332	85718	95988	106120	116088	
0											
	-----			-----			-----			-----	
0	0	0	0		0	0	0	0	0	0	
	-----			-----			-----			-----	

CASH FLOW (BEFORE FINANCING EXPENCES) 4.7  
EQUITY NEGATIVE

OF PAY BACK TIME:  
annum 560886  
r annum 394689  
or annum 133724

32473  
YEARS FROM THE START UP

**SECTION 2**

10	11	12	13	14	15	16	17	18	19
560886	560886	560886	560886	560886	560886	560886	560886	560886	604886
348035	348035	348035	348035	348035	348035	348035	348035	348035	348035
46654	46654	46654	46654	46654	46654	46654	46654	46654	46654
166197	166197	166197	166197	166197	166197	166197	166197	166197	178129
166197	166197	166197	166197	166197	166197	166197	166197	166197	71136
166197	166197	166197	166197	166197	166197	166197	166197	166197	78817
166197	166197	166197	166197	166197	166197	166197	166197	166197	328177
338246	253684	169123	84561	0					
84561	84561	84561	84561	84561					
54965	43972	32979	21986	10993	0	0	0	0	
59048	58325	57463	56436	55213	-38916	-46379	-55274	-65874	-256014
519343	577667	635130	691567	746779	707864	661485	606211	540337	284882
85718	95988	106120	116086	125855	127281	119818	110923	100323	72159
0	0	0	0	0	0	0	0	0	0

**SECTION 3**

PROJECT CASH FLOW, Rs 1000

-Price of sulphur Rs 3,010.40 per ton

Production capacity 50 % during the 5th year and 100 % later

Year	1	2	3	4	5	6
Net revenue					332869	694338
Variable operating cost					215025	381288
Change in product inventories					17919	13855
Fixed operating cost					46654	46654
Gross margin	0	0	0	0	89109	280251
Working capital					41357	43968
Investment cost without interests	102157	322710	740384	364314	46733	
Annual cash flow before financing cost	-102157	-322710	-740384	-364314	1019	236283
Long term loans						
drawing	0	0	340857	437033	68660	
cumulative (end of year)	0	0	340857	777890	761895	677240
pay back					84655	84655
interest % 13	0	0	22156	72719	105589	99046
Short term loans						
change	0	0	0	0	132125	32285
cumulative (end of year)	0	0	0	0	132125	99840
interest % 17.5	0	0	0	0	11561	20297
Equity requirements	102157	322710	421683	0		
Available for share holders	-102157	-322710	-421683	0	0	0

INTERNAL RATE OF RETURN OF CASH FLOW (BEFORE FINANCING)  
INTERNAL RATE OF RETURN OF EQUITY 10.8%

NET PROFIT FOR CALCULATION OF PAY BACK TIME:  
-Sales revenue per annum 722936  
-Production cost per annum 427942  
-Average interest per annum 49086

SECTION 1

PAY BACK TIME

245908  
6.4 YEARS FROM THE START UP

A P P E N D I X 6-3

on

5th year and 100 % later on

4	5	6	7	8	9	10	11	12
332869	694338	722936	722936	722936	722936	722936	722936	722936
215025	381288	381288	381288	381288	381288	381288	381288	381288
17919	13855							
46654	46654	16654		46654	46654	46654	46654	46654
0	89109	280251	294994	294994	294994	294994	294994	294994
	41357	43968	2383					
64314	46733							
64314	1019	236283	292611	294994	294994	294994	294994	294994
137033	68660							
777890	761895	677240	592585	507930	423275	338620	253965	169310
	84655	84655	84655	84655	84655	84655	84655	84655
72719	105589	99046	88041	77036	66031	55026	44021	33015
0	132125	32285	-108576	0	0	0	0	0
0	132125	99840	0	0	0	0	0	0
0	11561	20297	8736	0	0	0	0	0
0								
0	0	0	11338	133303	144308	155313	166318	177324

CASH FLOW (BEFORE FINANCING EXPENCES) 12.0%  
CITY 10.8%

PAY BACK TIME:  
annum 722936  
annum 427942  
annum 49086

245908  
YEARS FROM THE START UP

**SECTION 2**

10	11	12	13	14	15	16	17	18	
722936	722936	722936	722936	722936	722936	722936	722936	722936	7891
381288	381288	381288	381288	381288	381288	381288	381288	381288	381288
46654	46654	46654	46654	46654	46654	46654	46654	46654	16654
294994	294994	294994	294994	294994	294994	294994	294994	294994	3294
294994	294994	294994	294994	294994	294994	294994	294994	294994	16611
338620	253965	169310	84655	0					
84655	84655	84655	84655	84655					
55026	44021	33015	22010	11005	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	
155313	166318	177324	188329	199334	294994	294994	294994	294994	16611

**SECTION 3**



PROJECT CASH FLOW, Rs 1000 (CALCULATION OF ECONOMIC INTERNAL RATE OF RETURN)

The investment and operating costs are without duties and taxes

- Price of sulphur Rs 2,573 per ton

- Production capacity 50 % during the 5th year and 100 % later

Year	1	2	3	4	5	6
Net revenue					287160	598764
Variable operating cost					204273	362223
Change in product inventories					17023	13162
Fixed operating cost					44743	44743
Gross margin	0	0	0	0	55167	204960
Working capital					36461	38850
Investment cost without interests	85700	252543	583320	305842	36963	
Annual cash flow before financing cost	-85700	-252543	-583320	-305842	-18257	166110
Long term loans						
drawing	0	0	259474	363180	56300	
cumulative (end of year)	0	0	259474	622654	611059	543163
pay back					67895	67895
interest % 13	0	0	16866	57338	84605	79438
Short term loans						
change	0	0	0	0	125432	3478
cumulative (end of year)	0	0	0	1	125433	128911
interest % 17.5	0	0	0	0	10975	22255
Equity requirements	85700	252543	340712	0		
Available for share holders	-85700	-252543	-340712	0	0	0

INTERNAL RATE OF RETURN OF CASH FLOW (BEFORE FINANCING)  
INTERNAL RATE OF RETURN OF EQUITY 8.8%

NET PROFIT FOR CALCULATION OF PAY BACK TIME:

- Sales revenue per annum 623207  
- Production cost per annum 406966  
- Average interest per annum 40858

175383

PAY BACK TIME

7.2 YEARS FROM THE START UP

SECTION 1

RETURN)  
without duties and taxes

th year and 100 % later on

	4	5	6	7	8	9	10	11	12	13
		287160	598764	623207	623207	623207	623207	623207	623207	623207
		204273	362223	362223	362223	362223	362223	362223	362223	362223
		17023	13162							
		44743	44743	44743	44743	44743	44743	44743	44743	44743
0	55167	204960	216241		216241	216241	216241	216241	216241	216241
	36461	38850	2037							
842	36963									
5842	18257	166110	214204		216241	216241	216241	216241	216241	216241
180	56300				407372	339477	271582	203686	135791	67895
654	611059	543163	475268		67895	67895	67895	67895	67895	67895
	67895	67895	67895		61785	52958	44132	35306	26479	17653
338	84605	79438	70611							
0	125432	3478	-58233		76862					
1	125433	128911	70678		0					
0	10975	22255	17464		6184					
0										
0	0	0	0		3514	95387	104214	113040	121866	130693

CASH FLOW (BEFORE FINANCING EXPENCES) 10.5%  
BY 8.8%

PAY BACK TIME:  
num 623207  
num 406966  
num 40858

175383

FROM THE START UP

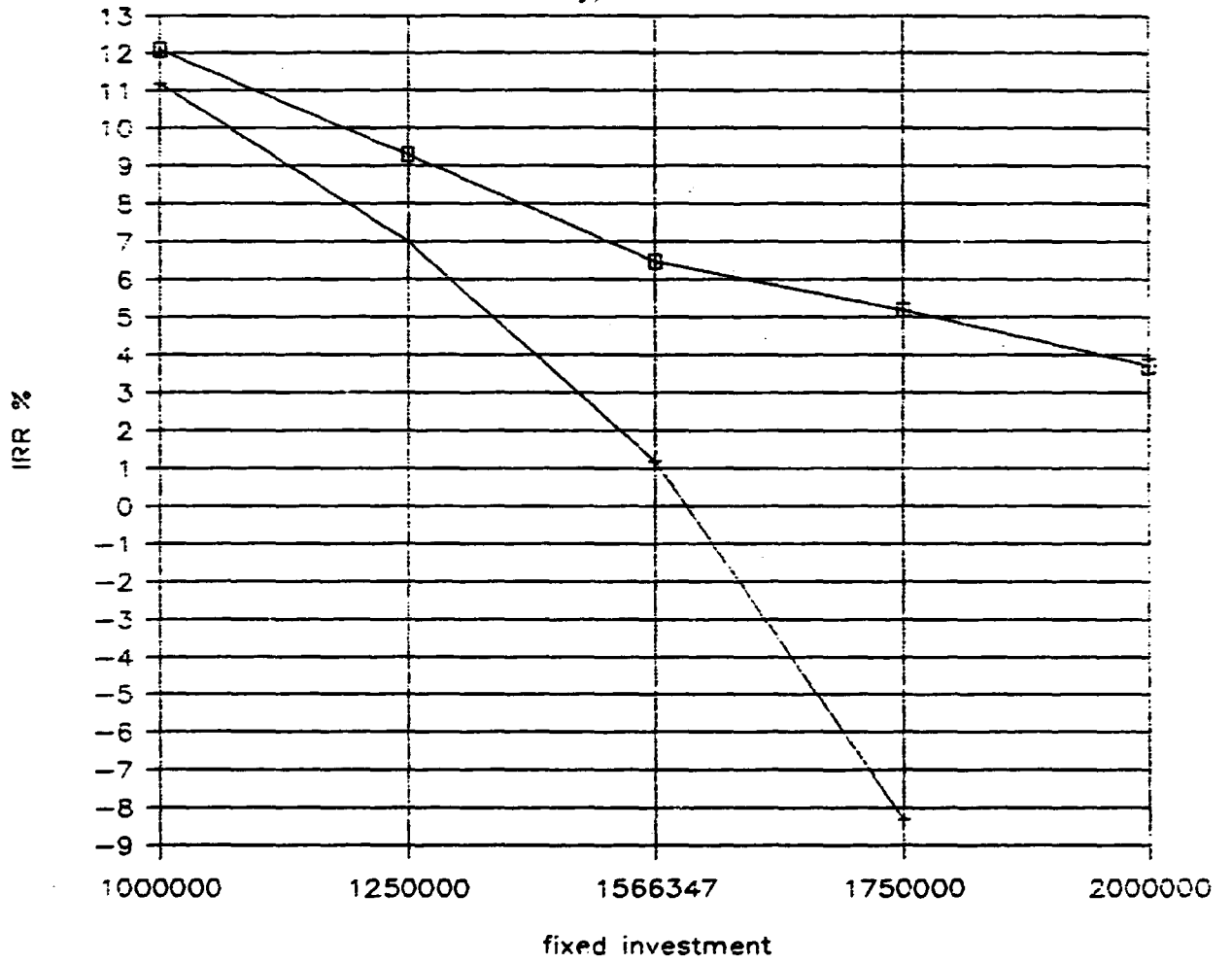
**SECTION 2**

10	11	12	13	14	15	16	17	18	19
623207	623207	623207	623207	623207	623207	623207	623207	623207	672091
362223	362223	362223	362223	362223	362223	362223	362223	362223	362223
									3177
44743	44743	44743	44743	44743	44743	44743	44743	44743	44743
216241	216241	216241	216241	216241	216241	216241	216241	216241	23335
									77318
									63209
216241	216241	216241	216241	216241	216241	216241	216241	216241	373902
271582	203686	135791	67895	0					
67895	67895	67895	67895	67895					
44132	35306	26479	17653	8826	0	0	0	0	0

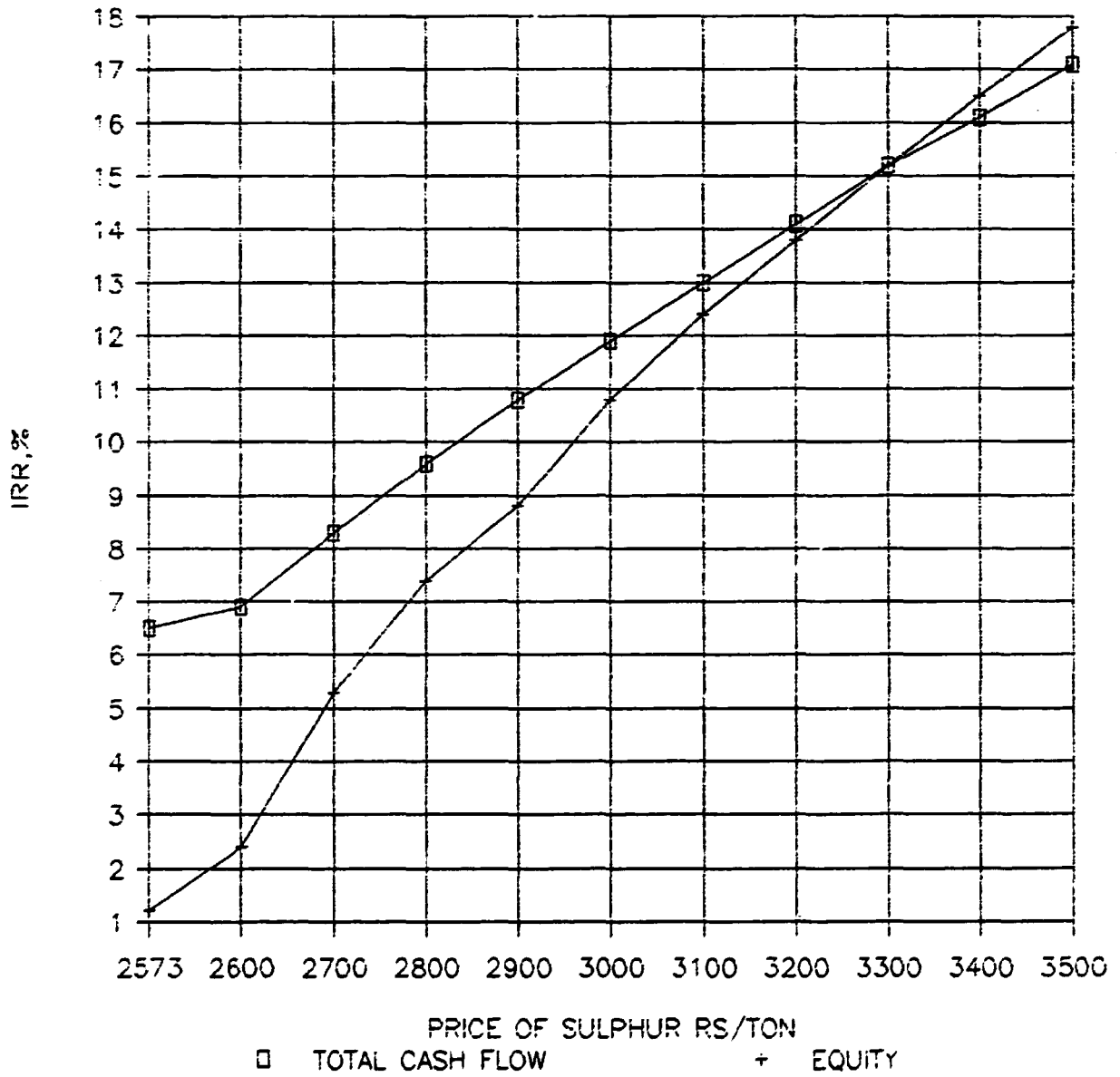
104214 113040 121866 130693 139519 216241 216241 216241 216241 373902

**SECTION 3**

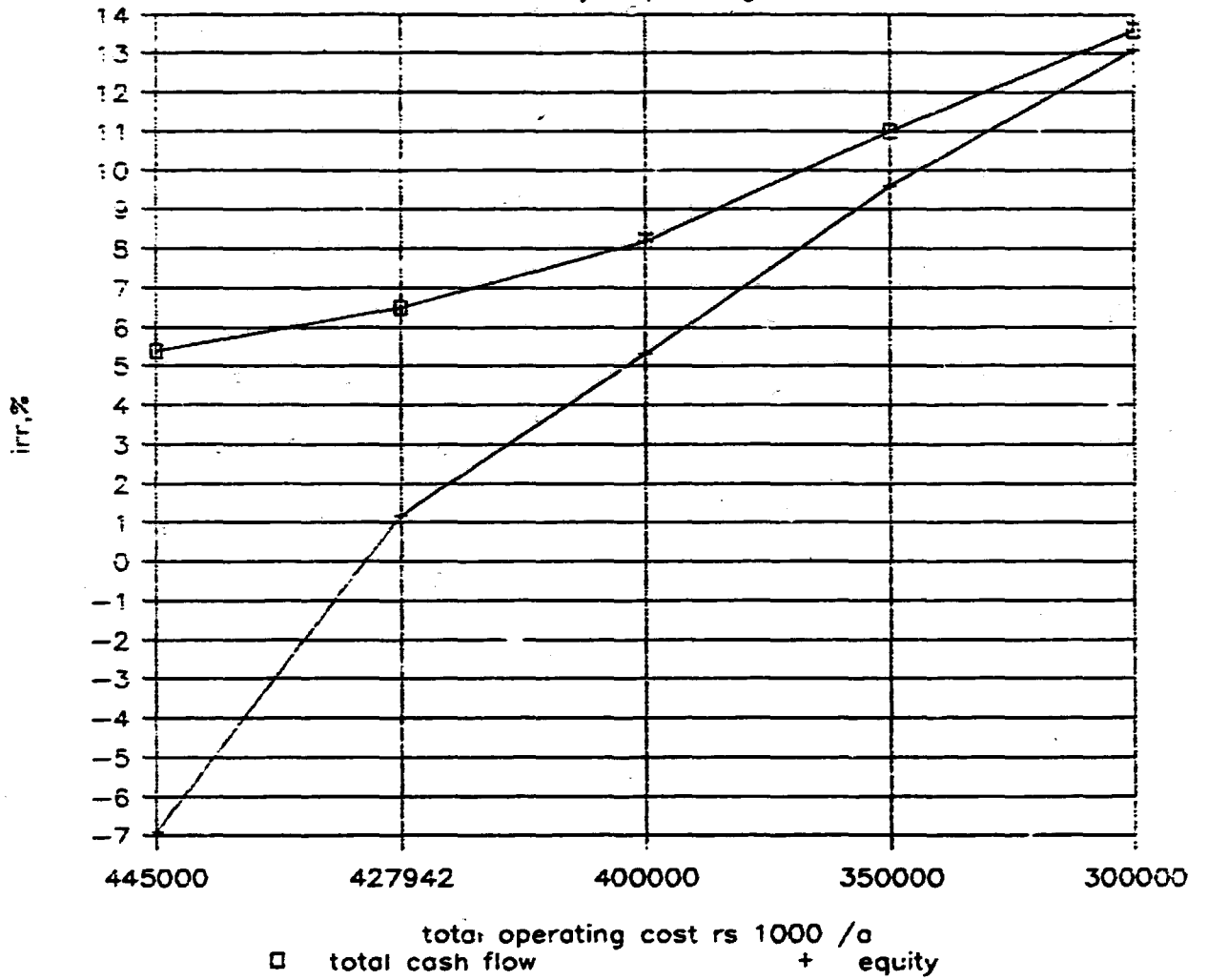
# IRR of cash flow and equity sensitivity/ investment cost



## IRR OF CASH FLOW AND EQUITY WITH DIFFERENT SULPHUR PRICES



irr of cash flow and equity  
sensitivity / operating cost



OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 1  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

200-----0

EQUIPMENT TYPE

FLASH SMELTER AREA

210-----0

EQUIPMENT TYPE

DRYER AND FSF FEED AREA

210-116-0100

EQUIPMENT TYPE

CONCENTRATE DRY BIN

CAPACITY

1100 T

VOLUME  
MATERIAL

(TOTAL) 600 M3  
CONCRETE APPROX. 250 M3

MANUFACTURER

LCCAL

210-116-0200

EQUIPMENT TYPE

CONCENTRATE DRY BIN

CAPACITY

1100 T

VOLUME  
MATERIAL

(TOTAL) 600 M3  
CONCRETE APPROX. 250 M3

MANUFACTURER

LCCAL

210-116-0300

EQUIPMENT TYPE

CONCENTRATE DRY BIN

CAPACITY

1100 T

VOLUME  
MATERIAL

(TOTAL) 600 M3  
CONCRETE APPROX. 250 M3

MANUFACTURER

LCCAL

PUTOKUMPU DY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 2  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT : EQUIPMENT LIST (ATNB)  
PUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

210-116-0400

EQUIPMENT TYPE  
SERVICE

CAY BIN  
TCP SHALE CAY BIN

CAPACITY

600 T

VOLUME  
MATERIAL

(TOTAL) 300 M3  
CONCRETE APPROX. 180 M3

MANUFACTURER

LOCAL

210-117-0100

EQUIPMENT TYPE

DRYED CHARGE BIN

VOLUME  
MATERIAL  
WEIGHT

(TOTAL) 350 M3  
STEEL  
APPROX. 60 T (INCL. STEEL SUPPORTS)

MANUFACTURER

LOCAL

210-117-0200

EQUIPMENT TYPE

DRYED CHARGE BIN

VOLUME  
MATERIAL  
WEIGHT

(TOTAL) 50 M3  
STEEL  
APPROX. 20 T (INCL. SUPPORTS)

MANUFACTURER

LOCAL



OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 3  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

CAPACITY

140 T/H

MAIN DIMENSIONS

LENGTH 33000 MM  
WIDTH 1000 MM  
INCLANATION:HORIZONTAL  
APPRX. 5 T

WEIGHT

INCLUDING

BELT SCALE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-167-0100-M1\*\*\* 4 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LCCAL

210-167-0200

EQUIPMENT TYPE

BELT CONVEYOR

CAPACITY

140 T/H

MAIN DIMENSIONS

LENGTH 75000 MM  
WIDTH 1000 MM  
INCLANATION:14 DEGREES  
APPRX. 12 T

WEIGHT

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-167-0200-M1\*\*\* 11 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LCCAL

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 4  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

210-167-0300

EQUIPMENT TYPE

BELT CONVEYOR

SERVICE

FOR TOP SHALE

CAPACITY

40 T/H

MAIN DIMENSIONS

LENGTH 7000 MM  
INCLANATION: HGRIZONTAL

BELT WIDTH  
WEIGHT

650 MM  
APPROX. 1 T

INCLUDING

BELT SCALE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-167-0300-M1 \*\*\* 3.0 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LOCAL

210-168-0100

EQUIPMENT TYPE

DRAG CONVEYOR

CAPACITY

80 T/H

MAIN DIMENSIONS

LENGTH 5000 MM  
WIDTH 800 MM

WEIGHT

APPROX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-168-0100-M1 \*\*\* 7,5 \*\*\*  
DRAG CONVEYOR

MANUFACTURER

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 5  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-168-C200

EQUIPMENT TYPE

DRAG CONVEYOR

CAPACITY

80 T/H

MAIN DIMENSIONS

LENGTH 5000 MM

WIDTH 800 MM

WEIGHT

APPRX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-168-0200-M1 \*\*\* 7,5 \*\*\*  
DRAG CONVEYOR

MANUFACTURER

FOREIGN

210-170-0100

EQUIPMENT TYPE

PNEUMATIC CONVEYOR SYSTEM

SERVICE

FOR DRIED CHARGE

CAPACITY

150 T/H

WEIGHT

APPRX. 20 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-170-0100-M1 \*\*\* 132 \*\*\*  
AIR BLOWER  
\*\*\*210-170-0100-M2 \*\*\* 132 \*\*\*  
AIR BLOWER,STAND BY  
\*\*\*210-170-0100-M3 \*\*\* 1,1 \*\*\*  
AIR LOCK  
\*\*\*210-170-0100-M4 \*\*\* 1,1  
AIR LOCK  
\*\*\*210-170-0100-M5 \*\*\* 5 \*\*\*  
RETURN AIR FAN

MANUFACTURER

FOREIGN

CUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 6  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
CUTKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-194-0100

EQUIPMENT TYPE

MULTICOIL DRYER

TYPE

STEAM DRYER

CAPACITY  
PRESSURE  
MATERIAL  
WEIGHT

70 T/H  
(STEAM) 20 BAR  
AISI 316  
APPRX. 30 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-194-0100-M1\*\*\* 160 \*\*\*  
MULTICOIL DRYER

MANUFACTURER

FOREIGN

210-194-0200

EQUIPMENT TYPE

MULTICOIL DRYER

TYPE

STEAM DRYER

CAPACITY  
PRESSURE  
MATERIAL  
WEIGHT

70 T/H  
(STEAM) 20 BAR  
AISI 316  
APPRX. 30 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-194-0200-M1 \*\*\* 160 \*\*\*  
MULTICOIL DRYER

MANUFACTURER

FOREIGN

GUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 7  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTKUMPU NO : 360 100 900 001 ALT1  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

210-212-0100

EQUIPMENT TYPE

EXHAUST AIR FAN

SERVICE

EXHAUST AIR FAN FOR BAG FILTER

CAPACITY  
MATERIAL  
WEIGHT

30000 NM3/H  
AISI 316  
APPRCX. 1,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-212-0100-M1 \*\*\* 45 \*\*\*  
EXHAUST AIR FAN

MANUFACTURER

FOREIGN

210-218-0100

EQUIPMENT TYPE

BELT FEEDER FOR CONCENTRATE

CAPACITY

25-120 T/H

BELT LENGTH  
BELT WIDTH  
BELT INCLINE  
WEIGHT

12000 M  
1200 MM  
NONE  
APPRCX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-218-0100-M1\*\*\* 7,5 \*\*\*  
BELT FEEDER

MANUFACTURER

LOCAL

GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 8  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTOKUMPU NO : 360 100 900 001 ALT1  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

210-218-0200

EQUIPMENT TYPE

BELT FEEDER FOR CONCENTRATE

CAPACITY

25-120 T/H

BELT LENGTH  
BELT WIDTH  
BELT INCLINE  
WEIGHT

12000 M  
1200 MM  
NCNE  
APPRX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-218-0200-M1\*\*\* 7,5 \*\*\*  
BELT FEEDER

MANUFACTURER

LCCAL

210-218-0300

EQUIPMENT TYPE

BELT FEEDER FOR CONCENTRATE

CAPACITY

25-120 T/H

BELT LENGTH  
BELT WIDTH  
BELT INCLINE  
WEIGHT

12000 M  
1200 MM  
NCNE  
APPRX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-218-0300-M1\*\*\* 7,5 \*\*\*  
BELT FEEDER

MANUFACTURER

LCCAL

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 9  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-218-0400

EQUIPMENT TYPE

BELT FEEDER

SERVICE

BELT FEEDER FOR TOP SHALE

CAPACITY

4-40 T/h

BELT LENGTH  
BELT WIDTH  
BELT INCLINE  
WEIGHT

8000 MM  
800 MM  
NONE  
APPRX. 5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-218-0400-M1 \*\*\* 3,0 \*\*\*  
BELT FEEDER

MANUFACTURER

LCCAL

210-411-0100

EQUIPMENT TYPE

VIBRATING SCREEN

CAPACITY

140 T/H

FRACTION

25 MM

MATERIAL  
WEIGHT

CARBON STEEL  
APPRX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-411-0100-M1 \*\*\* 15 \*\*\*  
VIBRATING SCREEN

MANUFACTURER

LCCAL

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 10  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-417-0100

EQUIPMENT TYPE

BAG FILTER

CAPACITY

30000 NM3/H

TEMPERATURE

110 C

WEIGHT  
MATERIAL

APPRCX. 5 T  
HCUSING:AISI316,BAGS:POLYACRYLNITR.

MANUFACTURER

FOREIGN

220-----0

EQUIPMENT TYPE

FLASH SMELTING FURNACE AREA

220-108-0100

EQUIPMENT TYPE

GRANULATION BASIN

SERVICE

FOR SLAG

DIMENSIONS

L X W X H :

MATERIAL

11 X 3 X 2 M

MANUFACTURER

CONCRETE,ESTIMATED VOLUME:40 M3

LOCAL

220-108-0200

EQUIPMENT TYPE

GRANULATION BASIN

SERVICE

FOR SLAG

DIMENSIONS

L X W X H :

MATERIAL

11 X 3 X 2 M

MANUFACTURER

CONCRETE,ESTIMATED VOLUME:40 M3

LOCAL



GUTCKUMPU DY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 11  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (AFNB)  
GUTCKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-131-0100

EQUIPMENT TYPE

COAL DUST BURNER

CAPACITY

0,3- 1 T/H

WEIGHT

APPROX. 1 T

MANUFACTURER

LOCAL

220-131-0200

EQUIPMENT TYPE

COAL DUST BURNER

CAPACITY

0,3- 1 T/H

WEIGHT

APPROX. 1 T

MANUFACTURER

LOCAL

220-131-0300

EQUIPMENT TYPE

COAL DUST BURNER

CAPACITY

0,3- 1 T/H

WEIGHT

APPROX. 1 T

MANUFACTURER

LOCAL

220-131-0400

EQUIPMENT TYPE

COAL DUST BURNER

CAPACITY

0,3- 1 T/H

WEIGHT

APPROX. 1 T

MANUFACTURER

LOCAL

220-131-0500

EQUIPMENT TYPE

COAL DUST BURNER

CAPACITY

0,3- 1 T/H

WEIGHT

APPROX. 1 T

MANUFACTURER

LOCAL

BUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 12  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

220-131-0600

EQUIPMENT TYPE

COAL DUST BURNER

CAPACITY  
WEIGHT

0,3- 1 T/H  
APPRCX. 1 T

MANUFACTURER

LOCAL

220-133-0100

EQUIPMENT TYPE

AUXILIARY BURNER

SERVICE

START UP BURNER

CAPACITY  
FUEL  
WEIGHT

150-600 KG/H  
LIGHT OIL  
APPRCX. 1 T

MANUFACTURER

LOCAL

220-133-0200

EQUIPMENT TYPE

AUXILIARY BURNER

SERVICE

START UP BURNER

CAPACITY  
FUEL  
WEIGHT

150-600 KG/H  
LIGHT OIL  
APPRCX. 1 T

MANUFACTURER

LOCAL

220-140-0100

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

DIMENSIONS

LENGTH 12000 MM

MATERIAL  
WEIGHT

COPPER  
APPRCX. 11 T

MANUFACTURER

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 13  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-140-0200

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

DIMENSIONS

LENGTH 12000 MM

MATERIAL  
WEIGHT

CCPPER  
APPRCX.11 T

MANUFACTURER

FCREIGN

220-140-0300

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

DIMENSIONS

LENGTH 12000 MM

MATERIAL  
WEIGHT

CCPPER  
APPRCX.11 T

MANUFACTURER

FCREIGN

220-140-0400

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

DIMENSIONS

LENGTH 12000 MM

MATERIAL  
WEIGHT

CCPPER  
APPRCX.11 T

MANUFACTURER

FCREIGN

GUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 14  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

220-140-0500

EQUIPMENT TYPE

GRANULATION LAUNDER

DIMENSIONS

LENGTH 3500 MM

MATERIAL  
WEIGHT

STEEL  
APPRX. 1,5 T

MANUFACTURER

LOCAL

220-140-0600

EQUIPMENT TYPE

GRANULATION LAUNDER

DIMENSIONS

LENGTH 3500 MM

MATERIAL  
WEIGHT

STEEL  
APPRX. 1,5 T

MANUFACTURER

LOCAL

220-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

SERVICE

FOR SLAG

CAPACITY

100 T/H

MAIN DIMENSIONS

LENGTH 3500 MM  
WIDTH 650 MM

BELT INCLINE  
WEIGHT

10 DEGREES  
APPROX. 3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-167-0100-M1 \*\*\*11 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LOCAL

GUTKUMPU DY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 15  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT :EQUIPMENT LIST (ATNB)  
GUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-174-0100

EQUIPMENT TYPE

RAKE CLASSIFIER

TYPE  
SERVICE

SCRAPEK DEWATERING CONVEYOR  
FOR SLAG

CAPACITY

100 T/H

MAIN DIMENSIONS

L:11000 MM  
B:2000 MM

WEIGHT

APPRCX. 25 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-174-0100-M1 \*\*\* 11 \*\*\*  
RAKE CLASSIFIER

MANUFACTURER

FCREIGN

220-174-0200

EQUIPMENT TYPE

RAKE CLASSIFIER

TYPE  
SERVICE

SCRAPEK DEWATERING CONVEYOR  
FOR SLAG

CAPACITY

100 T/H

MAIN DIMENSIONS

L: 11000 MM, B:2000 MM

WEIGHT

APPRCX. 25 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-174-0200-M1 \*\*\* 11 \*\*\*  
RAKE CLASSIFIER

MANUFACTURER

FCREIGN

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 16  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-198-0100

EQUIPMENT TYPE

GAS DUCTWORK

SERVICE

PROCESS AND COMBUSTION  
AIR DUCTING

INCLUDING

DIMENSIONS

TOTAL LENGTH:150 M,WALL THICKNESS:  
4 AND 6 MM,DIAM:700 AND 1600 MM  
MILD STEEL  
21 T TOTAL (SUPPORTS NOT INCL.)

MATERIAL  
WEIGHT

MANUFACTURER

LCCAL

OUTKUMPU DY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 17  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-158-0200

EQUIPMENT TYPE

GAS DUCTWORK

SERVICE

OXYGEN DUCTING FOR SMELTER  
PLANT.

INCLUDING

DIMENSIONS

TOTAL LENGTH:250 M, WALL THICKNESS:  
4 MM, DIAM:700 MM  
STAINLESS STEEL  
18 T TOTAL (SUPPORTS EXCLUDED)

MATERIAL  
WEIGHT

MANUFACTURER

LOCAL

220-212-0100

EQUIPMENT TYPE

PROCESS AIR FAN

TYPE

CENTRIFUGAL

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

40000 NM<sup>3</sup>/H  
10 KPA  
35 C  
APPRX. 2.5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 220-212-0100-M1\*\*\* 160 \*\*\*  
PROCESS AIR FAN

MANUFACTURER

LOCAL

GUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 18  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-212-0200

EQUIPMENT TYPE

PROCESS AIR FAN

TYPE

CENTRIFUGAL

CAPACITY

40000 NM3/H

PRESSURE

10 KPA

TEMPERATURE

35 C

WEIGHT

APPROX. 2.5 T

MOTOR NO./RATING (KW)

\*\*\* 220-212-0200-M1\*\*\* 160 \*\*\*

MOTOR TITLE

PROCESS AIR FAN

MANUFACTURER

LCCAL

220-212-0300

EQUIPMENT TYPE

COMBUSTION AIR FAN

TYPE

CENTRIFUGAL

CAPACITY

20000 NM3/H

PRESSURE

9 KPA

TEMPERATURE

35 C

WEIGHT

APPROX. 2 T

MOTOR NO./RATING (KW)

\*\*\*220-212-0300-M1\*\*\* 110 \*\*\*

MOTOR TITLE

COMBUSTION AIR FAN

MANUFACTURER

LCCAL

20-223-0100

EQUIPMENT TYPE

DRIED CHARGE DRAG FEEDER

CAPACITY

7-70 T/H

MAIN DIMENSIONS

LENGTH 10000 MM

WIDTH 800 MM

WEIGHT

APPROX. 8 T

MOTOR NO./RATING (KW)

\*\*\*220-223-0100-M1 \*\*\* 11 \*\*\*

MOTOR TITLE

DRAG FEEDER

MANUFACTURER

FOREIGN



OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-29 PAGE NO: 19  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : JKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

220-223-0200

EQUIPMENT TYPE

DRYED CHARGE DRAG FEEDER

CAPACITY

7-70 T/H

MAIN DIMENSIONS

LENGTH 10000 MM

WIDTH 800 MM

WEIGHT

APPROX. 8 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-223-0200-M1 \*\*\* 11 \*\*\*  
DRAG FEEDER

MANUFACTURER

FOREIGN

220-261-01J0

EQUIPMENT TYPE

FLASH SMELTING FURNACE

SERVICE

FOR PYRITE

CAPACITY

120 T/H

MAIN DIMENSIONS

REACTION SHAFT D=6.5 M H=7.0 M

SETTLER L=22 M

NO. OF TAP HOLES

UPTAKESHAFT D=6.0 M H=15 M

SLAG HOLES 4

BURNER OPENINGS

SETTLER 6 FOR COAL

MANUFACTURER

LOCAL/FOREIGN

REMARKS

STEEL CONSTRUCTION 950 T (LOCAL)  
BASIC BRICKS 1200 T (FOREIGN)  
NON BASIC BRICKS 370T (LOCAL)  
COOLING ELEMENTS 110 T (FOREIGN)  
SPRINGS 5 T (FOREIGN)

GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 20  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-289-0100

EQUIPMENT TYPE

CAPACITY  
TEMPERATURE RANGE  
WEIGHT

MANUFACTURER

JACKET WATER HEAT EXCHANGER

700 M3/H  
WATER IN:50 DEG.C. OUT:40 DEG.C.  
APPRCX. 5 T

LOCAL

220-289-0200

EQUIPMENT TYPE

SERVICE

CAPACITY  
TEMPERATURE RANGE  
WEIGHT

MANUFACTURER

JACKET WATER HEAT EXCHANGER

STAND BY

700 M3/H  
WATER IN:50 DEG.C. OUT:40 DEG.C.  
APPRGX. 5 T

LOCAL

220-289-0300

EQUIPMENT TYPE

CAPACITY  
TEMPERATURE RANGE  
WEIGHT

MANUFACTURER

SPRAY WATER HEAT EXCHANGER

300 M3/H  
WATER IN:50 DEG.C. OUT:40 DEG.C.  
APPRCX.2,5 T

LOCAL

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 21  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-289-0400

EQUIPMENT TYPE

SPRAY WATER HEAT EXCHANGER

SERVICE

STAND BY

CAPACITY  
TEMPERATURE RANGE  
WEIGHT

300 M3/H  
WATER IN:5C DEG.C. CUT:40 DEG.C.  
APPROX. 2,5 T

MANUFACTURER

LCCAL

220-318-0100

EQUIPMENT TYPE

OVERHEAD TRAVELLING CRANE

LIFTING CAPACITY  
LIFTING HEIGHT  
SPAN  
WEIGHT

10 T  
34 M  
24 M  
APPROX. 20 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-318-0100-M1 \*\*\* 11 \*\*\*  
OVERHEAD TRAVELLING CRANE  
\*\*\*220-318-0100-M2 \*\*\* 2,2 \*\*\*  
OVERHEAD TRAVELLING CRANE  
\*\*\*220-318-0100-M3 \*\*\* 1,1 \*\*\*  
OVERHEAD TRAVELLING CRANE

MANUFACTURER

LCCAL

220-376-0100

EQUIPMENT TYPE

JACKET WATER PUMP

CAPACITY  
PRESSURE  
WEIGHT

700 M3/H  
650 KPA  
APPROX. 3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0100-M1 \*\*\*200 \*\*\*  
JACKET WATER PUMP

MANUFACTURER

LCCAL

GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 22  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-376-0200

EQUIPMENT TYPE

JACKET WATER PUMP

SERVICE

STAND BY

CAPACITY  
PRESSURE  
WEIGHT

700 M3/H  
650 KPA  
APPRCX. 3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0200-M1 \*\*\*200 \*\*\*  
JACKET WATER PUMP

MANUFACTURER

LOCAL

220-376-0400

EQUIPMENT TYPE

SPRAY WATER PUMP

CAPACITY  
PRESSURE  
WEIGHT

300 M3/H  
600 KPA  
APPRCX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0400-M1 \*\*\* 90 \*\*\*  
SPRAY WATER PUMP

MANUFACTURER

LOCAL

DUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 23  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

220-376-0500

EQUIPMENT TYPE

SPRAY WATER PUMP

SERVICE

STAND BY

CAPACITY  
PRESSURE  
WEIGHT

300 M3/H  
600 KPA  
APPROX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0500-M1 \*\*\* 90 \*\*\*  
SPRAY WATER PUMP

MANUFACTURER

LCCAL

220-376-0700

EQUIPMENT TYPE

GRANULATION WATER PUMP

CAPACITY  
PRESSURE  
WEIGHT

600 M3/H  
350 KPA  
APPROX. 2,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0700-M1 \*\*\* 90 \*\*\*  
GRANULATION WATER PUMP

MANUFACTURER

LCCAL

220-376-0800

EQUIPMENT TYPE

GRANULATION WATER PUMP

CAPACITY  
PRESSURE  
WEIGHT

600 M3/H  
350 KPA  
APPROX. 2,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0800-M1 \*\*\* 90 \*\*\*  
GRANULATION WATER PUMP

MANUFACTURER

LCCAL

BUTOKUMPU BY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 24  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-376-0900

EQUIPMENT TYPE

GRANULATION WATER PUMP

SERVICE

STAND BY

CAPACITY  
PRESSURE  
WEIGHT

600 M3/H  
350 KPA  
APPROX. 2.5

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0900-M1 \*\*\* 90 \*\*\*  
GRANULATION WATER PUMP

MANUFACTURER

LOCAL

220-435-0100

EQUIPMENT TYPE

CONCENTRATE BURNER

CAPACITY  
MAIN DIMENSIONS

120 T/H

WEIGHT

APPROX. 5 T

MANUFACTURER

FOREIGN

220-519-0100

EQUIPMENT TYPE

JACKET WATER TANK

VOLUME  
MATERIAL

400 M3  
CONCRETE 100 M3  
STEEL COVER

MANUFACTURER

LOCAL

DUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 25  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTOKUMPU NO :560 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-519-0200

EQUIPMENT TYPE

SPRAY WATER TANK

VOLUME  
MATERIAL

300 M3  
CONCRETE 80 M3  
STEEL COVER

MANUFACTURER

LOCAL

220-519-0300

EQUIPMENT TYPE

CIL TANK

SERVICE

FOR HEAVY FUEL OIL

VOLUME  
DIMENSIONS

700 M3  
DIAM:9,5M ,HIGHT:10,0 M

MATERIAL

MILD STEEL

MANUFACTURER

LOCAL

REMARKS

SUPPLIED WITH STEAM HEATING PIPES

220-519-0400

EQUIPMENT TYPE

CIL TANK

SERVICE

FOR LIGHT FUEL OIL

VOLUME  
DIMENSIONS

18 M3  
DIAM:2,8M, HIGHT:3 M

MATERIAL

MILD STEEL

MANUFACTURER

LOCAL

CUTOKUMPU BY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 26  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
CUTCKJMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

220-569-0100

EQUIPMENT TYPE

MAIN DIMENSIONS

TEMPERATURE

WEIGHT

MANUFACTURER

REMARKS

EMERGENCY CAMPER BETWEEN FSF-WHB

6 X 5 M

WATER IN: 30 DEG.C. OUT: 60 DEG.C.  
APPRGX. 6 T

LCCAL

-  
WATER FLOW: 100 M<sup>3</sup>/H  
WATER PRESSURE: 4 BAR

230-----0

EQUIPMENT TYPE

PROCESS GAS HANDLING AREA

230-124-0100

EQUIPMENT TYPE

WASTE HEAT BOILER

TYPE  
SERVICE

FORCED CIRCULATION  
FOR FLASH SMELTING FURNACE

CAPACITY  
PRESSURE  
GAS FLOW  
TEMPERATURE

SATURATED STEAM 140 T/H  
70 BAR  
130000 NM<sup>3</sup>/H  
INLET 1250 C  
OUTLET 350 C

WEIGHT

APPRGX. BOILER: 600 T  
SUPPORTS: 350 T

MANUFACTURER

FOREIGN



JUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 27  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
JUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

230-198-0100

EQUIPMENT TYPE

GAS DUCTWORK

SERVICE

PROCESS GAS DUCTING FOR  
AREA 230

DIMENSIONS

TOTAL LENGTH: 175 M DIAM: 1800,  
2000, 2200 MM, WALL THICKNESS: 8 MM  
MILD STEEL  
71 T (TOTAL, SUPPORTS NOT INCLUDED)

MATERIAL  
WEIGHT

MANUFACTURER

LOCAL

230-212-0100

EQUIPMENT TYPE

PROCESS GAS FAN

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

70000 NM<sup>3</sup>/H  
4 KPA  
360 C  
APPRX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*230-212-0100-M1 \*\*\* 250 \*\*\*  
PROCESS GAS FAN

MANUFACTURER

FOREIGN

REMARKS

INVERTER REGULATED

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 28  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

230-212-0200

EQUIPMENT TYPE

PROCESS GAS FAN

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

70000 NM3/H  
4 KPA  
360 C  
APPRX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*230-220-0200-M1 \*\*\* 250 \*\*\*  
PROCESS GAS FAN

MANUFACTURER

FOREIGN

REMARKS

INVERTER REGULATED

230-372-0100

EQUIPMENT TYPE

EJECTOR

SERVICE

BY-PASS EJECTOR BETWEEN  
WHB AND EP.

CAPACITY  
MATERIAL

GAS FLOW 60 000 NM3/H  
STAINLESS STEEL

WEIGHT  
INCLUDING

APPROX. 1,5 T  
INLET VALVES

MANUFACTURER

FOREIGN

REMARKS

SUCTION: 1 KPA

GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 29  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

230-372-0200

EQUIPMENT TYPE

EJECTOR

SERVICE

BY-BASS EJECTOR AFTER EP.

CAPACITY  
MATERIAL

GAS FLCW: 20 000 NM<sup>3</sup>/H  
STAINLESS STEEL

WEIGHT  
INCLUDING

APPRX. 0,5 T  
INLET VALVE

MANUFACTURER

FOREIGN

REMARKS

-  
SUCTION: 1 KPA

230-372-0300

EQUIPMENT TYPE

EJECTOR

SERVICE

BY-EASS EJECTOR AFTER EP.

CAPACITY  
MATERIAL

GAS FLCW: 20 000 NM<sup>3</sup>/H  
STAINLESS STEEL

WEIGHT  
INCLUDING

APPRX. 0,5 T  
INLET VALVE

MANUFACTURER

FOREIGN

REMARKS

-  
SUCTION: 1 KPA

JUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 30  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
JUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

230-376-0100

EQUIPMENT TYPE

WATER PUMP

SERVICE

WHB CIRCULATION WATER PUMP

CAPACITY  
HEAD  
WEIGHT

1100 M3/H  
40 M  
APPRX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*230-376-0100-M1 \*\*\* 200 \*\*\*  
WHB CIRCULATION WATER PUMP

MANUFACTURER

FOREIGN

230-376-0200

EQUIPMENT TYPE

WATER PUMP

TYPE  
SERVICE

TURBINE DRIVE WATER PUMP  
WHB CIRCULATION WATER PUMP  
FOR EMERGENCY

CAPACITY  
HEAD  
WEIGHT

1100 M3/H  
40 M  
APPRX. 1.5 T

MANUFACTURER

FOREIGN

GUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 31  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
GUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

230-421-0100

EQUIPMENT TYPE

ELECTROSTATIC PRECIPITATOR

TYPE  
SERVICE

FCF WHB

CAPACITY  
TEMPERATURE  
WEIGHT

70000 NM<sup>3</sup>/H  
360 C  
APPRX. PRECIPITATOR 370 T  
SUPPORTS 50 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* SEVERAL, TOTAL \*\*\* 90 \*\*\*

MANUFACTURER

FOREIGN

230-421-0200

EQUIPMENT TYPE

ELECTROSTATIC PRECIPITATOR

TYPE  
SERVICE

FCF WHB

CAPACITY  
TEMPERATURE  
WEIGHT

70000 NM<sup>3</sup>/H  
360 C  
APPRX. PRECIPITATOR 370 T  
SUPPORTS 50 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* SEVERAL, TOTAL \*\*\* 90 \*\*\*

MANUFACTURER

FOREIGN

230-562-0100

EQUIPMENT TYPE

DISC VALVE

SERVICE

FCF EP.

MAIN DIMENSIONS  
WEIGHT

DIAMETER:2 M  
APPRX. 1 T

MANUFACTURER

LCCAL

DUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 32  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

230-562-0200

EQUIPMENT TYPE

DISC VALVE

SERVICE

FOR EP.

MAIN DIMENSIONS  
WEIGHT

DIAMETER: 2 M  
APPRCX. 1 T

MANUFACTURER

LOCAL

240-----0

EQUIPMENT TYPE

FLUE DUST HANDLING AREA

240-140-0100

EQUIPMENT TYPE

LAUNDER

TYPE  
SERVICE

FOR FLUE DLST

DIMENSIONS

L: 40000 MM W: 500 MM  
DEPTH: 500 MM

MATERIAL

CONCRETE 7 MS, STEEL COVERS

MANUFACTURER

LOCAL

JUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 95-08-28 PAGE NO: 33  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
JUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

240-168-0100

EQUIPMENT TYPE

DRAG CONVEYOR FOR WHB DUST

TYPE  
CAPACITY

WITH SCREEN  
15 T/H

MAIN DIMENSIONS

LENGTH 4000 MM  
WIDTH 800 MM  
APPROX. 22T

WEIGHT

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0100-M1 \*\*\* 5.5 \*\*\*  
DRAG CONVEYOR FOR WHB DUST

MANUFACTURER

FOREIGN

240-168-0200

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

CAPACITY

5 T/H

MAIN DIMENSIONS

LENGTH 2000 MM  
WIDTH 500 MM  
APPROX. 7 T

WEIGHT

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0200-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

MANUFACTURER

FOREIGN

240-168-0300

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

CAPACITY

5 T/H

MAIN DIMENSIONS

LENGTH 2000 MM  
WIDTH 500 MM  
APPROX. 7 T

WEIGHT

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0300-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

MANUFACTURER

FOREIGN

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 34  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

240-168-0400

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

CAPACITY

5 T/H

MAIN DIMENSIONS

LENGTH 20000 MM

WIDTH 500 MM

WEIGHT

APPRX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0400-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

MANUFACTURER

FOREIGN

240-168-0500

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

CAPACITY

5 T/H

MAIN DIMENSIONS

LENGTH 20000 MM

WIDTH 500 MM

WEIGHT

APPRX. 7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0500-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

MANUFACTURER

FOREIGN

240-209-0100

EQUIPMENT TYPE

WATER LOCK

TYPE  
SERVICE

WITH WATER NOZZLES  
FOR WHB DUST

VOLUME  
WEIGHT

1 M3  
APPRX. 0,5 T

MATERIAL

STAINLESS STEEL

MANUFACTURER

LCCAL



OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYHTE SMELTER

DATE :85-08-28 PAGE NO: 35  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

240-209-0200

EQUIPMENT TYPE

WATER LOCK

TYPE  
SERVICE

WITH WATER NOZZLES  
FOR EP DUST

VOLUME  
WEIGHT

1 M3  
APPROX. 0,5 T

MATERIAL

STAINLESS STEEL

MANUFACTURER

LOCAL

240-209-0300

EQUIPMENT TYPE

WATER LOCK

TYPE  
SERVICE

WITH WATER NOZZLES  
FOR EP DUST

VOLUME  
WEIGHT

1 M3  
APPROX. 0,5 T

MATERIAL

STAINLESS STEEL

MANUFACTURER

LOCAL

240-209-0400

EQUIPMENT TYPE

WATER LOCK

TYPE  
SERVICE

WITH WATER NOZZLES  
FOR EP DUST

VOLUME  
WEIGHT

1 M3  
APPROX. 0,5 T

MATERIAL

STAINLESS STEEL

MANUFACTURER

LOCAL

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 36  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

240-209-0500

EQUIPMENT TYPE

WATER LOCK

TYPE  
SERVICE

WITH WATER NOZZLES  
FOR EP DUST

VOLUME  
WEIGHT

1 M3  
APPRCX. 0,5 T

MATERIAL

STAINLESS STEEL

MANUFACTURER

LOCAL

240-374-0300

EQUIPMENT TYPE

SLURRY PUMP

I

SERVICE

UNDERFLOW SLURRY PUMP

CAPACITY  
HEAD

25 M3/H  
20 M

MATERIAL

STEEL WITH RUBBER LINING

WEIGHT

APPRCX. 0,8 T

MOTOR NO./RATING (KW)

\*\*\*240-374-0300-M1 \*\*\* 7.5 \*\*\*

MOTOR TITLE

SLURRY PUMP

MANUFACTURER

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 37  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

240-374-0400

EQUIPMENT TYPE

SLURRY PUMP

SERVICE

UNDERFLOW SLURRY PUMP, STAND-BY

CAPACITY  
HEAD

25 M<sup>3</sup>/H  
20 M

MATERIAL

STEEL WITH RUBBER LINING

WEIGHT

APPROX. 0,8 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-374-0400-M1 \*\*\* 7.5 \*\*\*  
SLURRY PUMP

MANUFACTURER

FOREIGN

240-376-0100

EQUIPMENT TYPE

WATER PUMP

SERVICE

OVERFLOW WATER FOR FLUE DUST SLURRY

CAPACITY  
HEAD  
WEIGHT

130 M<sup>3</sup>/H  
15 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-376-0100-M1 \*\*\* 15 \*\*\*  
WATER PUMP

MANUFACTURER

LCCAL

OUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 38  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

240-376-0200

EQUIPMENT TYPE

WATER PUMP

SERVICE

OVERFLOW FOR FLUE DUST SLURRY  
STAND-BY

CAPACITY  
HEAD  
WEIGHT

130 M<sup>3</sup>/H  
15 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-376-0200-M1 \*\*\* 15 \*\*\*  
WATER PUMP

MANUFACTURER

LCCAL

240-518-0100

EQUIPMENT TYPE

PUMP TANK

SERVICE

OVERFLOW WATER PUMP TANK

VOLUME  
MATERIAL

500 M<sup>3</sup>  
CONCRETE WALLS,STEEL COVER  
CONCRETE VOLUME ABOUT 100 M<sup>3</sup>

MANUFACTURER

LCCAL

DUTKUMPU DY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 39  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

240-532-0100

EQUIPMENT TYPE

THICKENER

DIMENSIONS

DIAMETER 30000 MM

MATERIAL

CONCRETE, APPROX. 370 M3

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-532-0100-M1 \*\*\* 3 \*\*\*  
THICKENER  
\*\*\*240-532-0100-M2 \*\*\* 3 \*\*\*  
THICKENER  
\*\*\*240-532-0100-M3 \*\*\* 0,5 \*\*\*  
THICKENER

MANUFACTURER

LOCAL

300-----0

EQUIPMENT TYPE

SULPHUR PLANT AREA

310-----0

EQUIPMENT TYPE

SULPHUR RECOVERING AREA

CUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 40  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
CUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-129-0100

EQUIPMENT TYPE

SULPHUR CONDENSING BOILER

CAPACITY

SATURATED STEAM 19 T/H (HIGH PRESS)  
SATURATED STEAM 8 T/H (LOW PRESS.)

PRESSURE

5,5 BAR  
1,7 BAR

GAS FLOW

125000 NM3/H

TEMPERATURE

INLET 360 C  
OUTLET 150 C

VOLUME

HEAT TRANSFER AREA 2650 / 2650 M2

MAIN DIMENSIONS

L X W X H  
24 X 7 X 4 M

MATERIAL

STEEL

WEIGHT

APPROX. BOILER 155 T  
SUPPORTS 145 T

MOTOR NO./RATING (KW)

\*\*\* 310-129-0100-M1\*\*\* 110 \*\*\*

MOTOR TITLE

CIRCULATION WATER PUMP

\*\*\* 310-129-0100-M2\*\*\* 90 \*\*\*

CIRCULATION WATER PUMP

MANUFACTURER

LCCAL

REMARKS

CIRCULATION PUMPS (ELECTRICAL  
AND TURBINE DRIVEN ARE INCLUDED)

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 41  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATN8)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-129-0200

EQUIPMENT TYPE

GAS COOLING BOILER

CAPACITY

SATURATED STEAM 26 T/H

PRESSURE

5,5 BAR

GAS FLOW  
TEMPERATURE

130000 NM3/H  
INLET 480 C  
OUTLET 250 C

VOLUME  
MAIN DIMENSIONS

HEAT TRANSFER AREA 2950 M2  
L X W X H  
15 X 7 X 4 M  
STEEL

MATERIAL

WEIGHT

APPRX. BOILER 180 T  
SUPPORTS 160 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-129-0200 \*\*\* 110 \*\*\*  
CIRCULATION WATER PUMP

MANUFACTURER

LCCAL

REMARKS

CIRCULATION PUMPS (ELECTRIC  
AND TURBINE DRIVEN) ARE INCLUDED

310-198-0100

EQUIPMENT TYPE

GAS DUCT

MANUFACTURER

TUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 42  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
TUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-198-0200

EQUIPMENT TYPE  
SERVICE

GAS DUCT  
PROCESS GAS DUCTINGS FOR AREA 310

DIMENSIONS

LENGTH: 80 M TOT. DIAM. 2M AND 2.2M

MATERIAL  
WEIGHT

STAINLESS STEEL WALL THICKNESS 8 MM  
36 T (TOTAL, SUPPORTS EXCLUDED)

MANUFACTURER

LCCAL

310-204-0100

EQUIPMENT TYPE  
SERVICE

STACK  
FOR SULPHUR LINE AND POWER PLANT

HEIGHT  
MATERIAL

150 M  
CONCRETE, 2800 M3

MANUFACTURER

LCCAL

310-209-0100

EQUIPMENT TYPE

WATER LOCK

VOLUME  
WEIGHT

5 M3  
APPRX. 5 T

MATERIAL

BODY OF MILD STEEL, LINED WITH  
STAINLESS STEEL

MANUFACTURER

LCCAL



OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 43  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-209-0200

EQUIPMENT TYPE

WATER LOCK

VOLUME  
WEIGHT

5 M3  
APPRCX. 5 T

MATERIAL

BODY OF MILD STEEL, LINED WITH  
STAINLESS STEEL

MANUFACTURER

LCCAL

310-209-0300

EQUIPMENT TYPE

WATER LOCK

VOLUME  
WEIGHT

5 M3  
APPRCX. 5 T

MATERIAL

BODY OF MILD STEEL, LINED WITH  
STAINLESS STEEL

MANUFACTURER

LCCAL

310-212-0100

EQUIPMENT TYPE

PROCESS GAS FAN

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

70000 NM3/H  
4 KPA  
170 C  
APPRCX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0100-M1 \*\*\* 160 \*\*\*  
PROCESS GAS FAN

MANUFACTURER

FOREIGN

REMARKS

INVERTER REGULATED

DUTCKUMPU GY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 44  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTCKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-212-0200

EQUIPMENT TYPE

PROCESS GAS FAN

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

70000 NM3/H  
4 KPA  
170 C  
APPRX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0200-M1 \*\*\* 160 \*\*\*  
PROCESS GAS FAN

MANUFACTURER

FOREIGN

REMARKS

INVERTER REGULATED

310-212-0300

EQUIPMENT TYPE

COMBUSTION AIR FAN

TYPE  
SERVICE

CENTRIFUGAL  
FOR GAS REFEATER

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

18000 NM3/H  
17 KPA  
35 C  
APPRX. 2.5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0300-M1 \*\*\* 132 \*\*\*  
COMBUSTION AIR FAN

MANUFACTURER

LOCAL

GUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-26 PAGE NO: 45  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTCKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-212-0400

EQUIPMENT TYPE  
SERVICE

COMBUSTION AIR FAN  
FOR GAS REFEATER, STAND-BY

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

18000 NM3/H  
17 KPA  
35 C  
APPRX. 2.5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0400-M1 \*\*\* 132 \*\*\*  
COMBUSTION AIR FAN

MANUFACTURER

LCCAL

310-212-0500

EQUIPMENT TYPE  
SERVICE

FAN  
EXHAUST GAS FAN

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

75000 NM3/H  
4.0 KPA  
140 C  
APPRX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0500-M1 \*\*\* 160 \*\*\*  
EXHAUST GAS FAN

MANUFACTURER

FOREIGN

REMARKS

INVERTER REGULATED

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 46  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-212-0600

EQUIPMENT TYPE

FAN

SERVICE

EXHAUST GAS FAN

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

75000 NM3/H  
4.0 KPA  
140 C  
APPRX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0600-M1 \*\*\* 160 \*\*\*  
EXHAUST GAS FAN

MANUFACTURER

FOREIGN

REMARKS

INVERTER REGULATED

310-212-0700

EQUIPMENT TYPE

COMBUSTION AIR FAN

SERVICE

FOR INCINERATOR

CAPACITY  
PRESSURE  
TEMPERATURE

16000 NM3/H  
10 KPA  
35 C

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0700-M1 \*\*\* 75 \*\*\*  
COMBUSTION AIR FAN

MANUFACTURER

LOCAL

DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 47  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-213-0800

EQUIPMENT TYPE

SECONDARY AIR FAN

SERVICE

FOR INCINERATOR

CAPACITY  
PRESSURE  
TEMPERATURE

19000 NM3/H  
10 KPA  
35 C

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-213-0800-M1 \*\*\* 90 \*\*\*  
SECONDARY AIR FAN

MANUFACTURER

LCCAL

310-263-0100

EQUIPMENT TYPE

INCINERATOR

SERVICE

FOR PROCESS GAS H2S COMBUSTION

CAPACITY  
DIMENSIONS

INLET: 145000 NM3/H OUT: 180000 NM3/H  
D: 4M L: 13M

MANUFACTURER

LCCAL

REMARKS

INCLUDING: BRICKLINING  
FUEL: HEAVY FUEL OIL  
FUEL CONSUMPTION: 1.4 T/H  
TEMP: INLET/OUTLET 130/400 C

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 48  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-281-0100

EQUIPMENT TYPE

GAS REHEATER

SERVICE

FOR HGT CATALYZER

CAPACITY

GAS INLET 125000 NM3/H  
OUTLET 143000 NM3/H  
INLET/OUTLET 150/430 C

TEMPERATURE

FUEL  
CONSUMPTION  
DIMENSIONS

CIL  
1.5 T/H  
D = 3 M L = 10 M

WEIGHT  
INCLUDING

APPRX. 71 T  
DUCT, BRICKLINING

MANUFACTURER

LOCAL

310-370-0100

EQUIPMENT TYPE

FUEL OIL PUMP

TYPE  
SERVICE

FOR GAS REHEATER

CAPACITY  
WEIGHT

1.7 M3/H  
APPRX. 0.3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0100-M1 \*\*\* 3 \*\*\*  
FUEL OIL PUMP

MANUFACTURER

LOCAL

JUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 49  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
JUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-370-0200

EQUIPMENT TYPE  
SERVICE

FUEL OIL PUMP  
FOR GAS REHEATER, STAND-BY

CAPACITY  
WEIGHT

1.7 M3/H  
APPROX. 0.3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0200-M1 \*\*\* 3 \*\*\*  
FUEL OIL PUMP

MANUFACTURER

LCCAL

GUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 50  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-370-0300

EQUIPMENT TYPE  
SERVICE

FUEL OIL PUMP  
FOR INCINERATOR

CAPACITY  
WEIGHT

1.7 M3/H  
APPROX. 0.3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0300-M1 \*\*\* 3 \*\*\*  
FUEL OIL PUMP

MANUFACTURER

LCCAL

310-374-0100

EQUIPMENT TYPE

SLURRY PUMP

SERVICE

FOR ABSORPTION TOWER  
(LIME STONE SLURRY)

CAPACITY

800 M3/H

PRESSURE

300 KPA

WEIGHT

APPROX. 0.9 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-374-0100-M1\*\*\* 90 \*\*\*  
SLURRY PUMP

MANUFACTURER

LCCAL



OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 51  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-374-0200

EQUIPMENT TYPE

SLURRY PUMP

II

SERVICE

FOR ABSORBTION TOWER  
(LIME STONE SLURRY)

CAPACITY  
PRESSURE  
WEIGHT

800 M3/H  
300 KPA  
APPRX. 0,9 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-374-0200-M1 \*\*\* 90 \*\*\*  
SLURRY PUMP

MANUFACTURER

LOCAL

310-374-0300

EQUIPMENT TYPE

SLURRY PUMP

TYPE  
SERVICE

FOR ABSORBTION TOWER  
FOR ABSORBTION POWER (STAND-BY)  
(LIME STONE SLURRY)

CAPACITY  
PRESSURE  
WEIGHT

800 M3/H  
300 KPA  
APPRX. 0,9 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-374-0300-M1 \*\*\* 90 \*\*\*  
SLURRY PUMP

MANUFACTURER

LOCAL

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 52  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-374-0400

EQUIPMENT TYPE

WATER PUMP

SERVICE

FOR TAILING POND OVERFLOW

CAPACITY

250 M<sup>3</sup>/H

PRESSURE

300 KPA

WEIGHT

APPRX. 0,5 T

MOTOR NO./RATING (KW)

\*\*\*310-370-0400-M1 \*\*\* 30 \*\*\*

MOTOR TITLE

WATER PUMP

MANUFACTURER

LOCAL

310-374-0500

EQUIPMENT TYPE

WATER PUMP

SERVICE

FOR TAILING POND OVERFLOW  
(STAND-BY)

CAPACITY

250 M<sup>3</sup>/H

PRESSURE

300 KPA

WEIGHT

APPRX. 0,5 T

MOTOR NO./RATING (KW)

\*\*\*310-370-0500-M1 \*\*\* 30 \*\*\*

MOTOR TITLE

WATER PUMP

MANUFACTURER

LOCAL

OUTKUMPU BY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 53  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-374-0600

EQUIPMENT TYPE

WATER PUMP

SERVICE

FOR SCRUBBER OUTLETWATER

CAPACITY  
PRESSURE  
WEIGHT

300 M3/H  
300 KPA  
APPRX. 1,0 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0600-M1 \*\*\* 30 \*\*\*  
WATER PUMP

MANUFACTURER

LOCAL

310-374-0700

EQUIPMENT TYPE

WATER PUMP

SERVICE

FOR SCRUBBER OUTLETWATER  
(STAND-BY)

CAPACITY  
PRESSURE  
WEIGHT

300 M3/H  
300 KPA  
APPRX. 1,0 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0700-M1 \*\*\* 30 \*\*\*  
WATER PUMP

MANUFACTURER

LOCAL

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 54  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-376-0100

EQUIPMENT TYPE

WATER PUMP

SERVICE

FOR GAS SCRUBBER

CAPACITY  
PRESSURE  
WEIGHT

50 M3/H  
600 KPA  
APPRX. 0.5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-376-0100-M1 \*\*\* 15 \*\*\*  
WATER PUMP

MANUFACTURER

LOCAL

310-376-0200

EQUIPMENT TYPE

WATER PUMP

SERVICE

FOR GAS SCRUBBER (STAND-BY)

CAPACITY  
PRESSURE  
WEIGHT

50 M3/H  
600 KPA  
APPRX. 0.5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-376-0200-M1 \*\*\* 15 \*\*\*  
WATER PUMP

MANUFACTURER

LOCAL

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 55  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-420-0100

EQUIPMENT TYPE

DEMISTER

CAPACITY  
TEMPERATURE

125000 NM<sup>3</sup>/H  
150 C

DIMENSIONS

DIAMETER 7000 MM, HEIGHT 12000 MM  
DEMISTER BED: HEIGHT 150 MM  
CARBON STEEL, BED OF ACIDPROOF STEEL

MATERIAL

WEIGHT

APPRX. 52 T (SUPPORTS INCL.)

MANUFACTURER

LOCAL

310-420-0200

EQUIPMENT TYPE

DEMISTER

CAPACITY  
TEMPERATURE

143000 NM<sup>3</sup>/H  
135 C

DIMENSIONS

DIAMETER 7000 MM, HEIGHT 8000 MM  
DEMISTER BED : HEIGHT 150 MM  
BED MATERIAL : ACID PROOF STEEL

MATERIAL

WEIGHT

APPRX. 30 T (SUPPORTS INCL.)

MANUFACTURER

LOCAL

GUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-C8-28 PAGE NO: 56  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
GUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-423-0100

EQUIPMENT TYPE

SCRUBBER

SERVICE

FOR PROCESS GAS CLEANING

CAPACITY  
GAS TEMPERATURE

18000 NM3/H  
INLET 400 C  
CUTLET 50 C

MAIN DIMENSIONS

DIAMETER 2500 MM  
HEIGHT 10000 MM

MATERIAL

STAINLESS AND ACID PROOF STEEL

WEIGHT

APPRCX. 27 T

MANUFACTURER

LOCAL

310-423-0200

EQUIPMENT TYPE

ABSORPTION TOWER

CAPACITY

200 000 NM3/H

GAS TEMPERATURE

60 DEG.

MAIN DIMENSIONS

DIAM: 4800 MM, HEIGHT:12000 MM

MATERIAL  
CONSTRUCTION

BODY:CARBON STEEL  
LINING:ACID PROOF STEEL

WEIGHT

APPRCX. 180 T

MANUFACTURER

LOCAL

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 57  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-431-0100

EQUIPMENT TYPE

AGGLCERATOR

CAPACITY  
TEMPERATURE

125 000 NM<sup>3</sup>/H  
150 C

DIMENSIONS

DIAMETER 3700 MM  
HEIGHT APPR. 2000 MM  
AGGLCERATOR BED: HEIGHT 100 MM  
BED:ACIDPROOF STEEL,BODY:CARB.STEEL

MATERIAL

WEIGHT

APPRCX. 25 T

MANUFACTURER

LOCAL

310-433-0100

EQUIPMENT TYPE

HGT CATALYZER

CAPACITY  
TEMPERATURE

143000 NM<sup>3</sup>/H  
480 C

NO.OF CELLS  
VOLUME  
DIMENSIONS

14  
EFFICIENT MASS VOLUME 730 M<sup>3</sup>  
MAIN DIM. L X W X H :  
22 X 8,5 X 15 M  
CELL : 1 X 8 X 6,5 M

MATERIAL  
WEIGHT

STAINLESS STEEL  
APPRGX. 300 T

MANUFACTURER

FOREIGN

GUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 58  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
GUTCKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-433-0200

EQUIPMENT TYPE

CCLD CATALYZER

CAPACITY  
TEMPERATURE

75000 NM3/H  
250 C (INLET)

NO.OF CELLS  
VOLUME  
DIMENSIONS

14  
EFFICIENT MASS VOLUME 730 M3  
MAIN DIM. L X W X H :  
22 X 8,5 X 15 M  
CELL : 1 X 8 X 6,5 M

MATERIAL  
WEIGHT

STEEL  
APPRCX. 300 T

MANUFACTURER

LCCAL

310-433-0300

EQUIPMENT TYPE

CCLD CATALYZER

CAPACITY  
TEMPERATURE

75000 NM3/H  
250 C (INLET)

NO.OF CELLS  
VOLUME  
DIMENSIONS

14  
EFFICIENT MASS VOLUME 730 M3  
MAIN DIM. L X W X H :  
22 X 8,5 X 15 M  
CELL : 1 X 8 X 6,5 M

MATERIAL  
WEIGHT

STEEL  
APPROX. 300 T

MANUFACTURER

LCCAL



OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 59  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-464-0100

EQUIPMENT TYPE

CAPACITY

GAS FLOW  
TEMPERATURE

DIMENSIONS

MATERIAL

WEIGHT

MANUFACTURER

SULPHUR CONDENSING TOWER

SULPHUR FLCW : 650 T/H

75000 NM3/H  
INLET 260 C  
OUTLET 135 C

DIAMETER 9000 MM  
HEIGHT 12000 MM

STEEL

APPROX. 260 T

FOREIGN

310-464-0200

EQUIPMENT TYPE

CAPACITY

GAS FLOW  
TEMPERATURE

DIMENSIONS

MATERIAL

WEIGHT

MANUFACTURER

SULPHUR CONDENSING TOWER

SULPHUR FLCW : 650 T/H

75000 NM3/H  
INLET 260 C  
OUTLET 135 C

DIAMETER 9000 MM  
HEIGHT 12000 MM

STEEL

APPROX. 260 T

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 60  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-516-0100

EQUIPMENT TYPE

MIXING TANK

SERVICE

FOR ABSORPTION TOWER

CAPACITY  
MATERIAL  
WEIGHT

100 M<sup>3</sup>/H  
CARBON STEEL  
APPRX. 10 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-516-0100-M1 \*\*\* 37 \*\*\*  
MIXING TANK

MANUFACTURER

LOCAL

310-518-0100

EQUIPMENT TYPE

PUMP TANK

SERVICE

FOR SCRUBBER OUTLET WATER

CAPACITY  
WEIGHT  
MATERIAL

100 M<sup>3</sup>  
APPRX. 10 T  
MILD STEEL

MANUFACTURER

LOCAL

320-----0

EQUIPMENT TYPE

SULPHUR HANDLING AREA

JUTEKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 61  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
JUTEKUMPU NO : 360 100 900 001 ALT1  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-117-0100

EQUIPMENT TYPE

BIN

SERVICE

LIME BIN

VOLUME  
MATERIAL  
WEIGHT

5 M3  
STEEL  
APPRX. 1 T

MANUFACTURER

LOCAL

320-129-0100

EQUIPMENT TYPE

SULPHUR COOLING BOILER

TYPE

NATURAL CIRCULATION

CAPACITY

SATURATED STEAM 3,5 T/H

PRESSURE

1,7 BAR

GAS FLOW  
TEMPERATURE

CIRCULATING SULPHUR FLOW 860 T/H  
INLET 133 C  
OUTLET 123 C

VOLUME

HEAT TRANSFER AREA 650 M2

WEIGHT

APPRX. 35 T

MANUFACTURER

FOREIGN

CUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 62  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
CUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-129-0200

EQUIPMENT TYPE

SULPHUR COOLING BOILER

TYPE

NATURAL CIRCULATION

CAPACITY

SATURATED STEAM 3,5 T/H

PRESSURE

1,7 BAR

GAS FLOW  
TEMPERATURE

CIRCULATING SULPHUR FLOW 860 T/H  
INLET 133 C  
OUTLET 123 C

VOLUME

HEAT TRANSFER AREA 650 M2

WEIGHT

APPRX. 35 T

MANUFACTURER

FOREIGN

320-129-0300

EQUIPMENT TYPE

SULPHUR COOLING BOILER

TYPE

NATURAL CIRCULATION

CAPACITY

SATURATED STEAM 3,5 T/H

PRESSURE

1,7 BAR

GAS FLOW  
TEMPERATURE

CIRCULATING SULPHUR FLOW 860 T/H  
INLET 133 C  
OUTLET 123 C

VOLUME

HEAT TRANSFER AREA 650 M2

WEIGHT

APPRX. 35 T

MANUFACTURER

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 63  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

SERVICE

FOR PRILLING TOWER

CAPACITY

150 T/H

MAIN DIMENSIONS

LENGTH 4000 MM  
WIDTH 650 MM

BELT INCLINE  
WEIGHT

HCRIZONTAL  
APPRCX. 5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-167-0100-M1 \*\*\* 5,5 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LOCAL

320-167-0200

EQUIPMENT TYPE

BELT CONVEYOR

SERVICE

FOR PRILLING TOWER

CAPACITY

150 T/H

MAIN DIMENSIONS

LENGTH 4000 MM  
WIDTH 650 MM

BELT INCLINE  
WEIGHT

HCRIZONTAL  
APPRCX. 5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-167-0200-M1 \*\*\* 5,5 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LOCAL

JUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 64  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
JUTKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-167-0300

EQUIPMENT TYPE

BELT CONVEYOR

SERVICE

FOR PRILLED SULPHUR

CAPACITY

150 T/H

MAIN DIMENSIONS

LENGTH 8000 MM  
WIDTH 650 MM

BELT INCLINE  
WEIGHT

6 DEGREES  
APPROX. 8 T

INCLUDING

BELT SCALE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-167-0300-M1 \*\*\* 11 \*\*\*  
BELT CONVEYOR

MANUFACTURER

LOCAL

320-172-0100

EQUIPMENT TYPE

SCREW CONVEYOR

SERVICE

FOR LIME

CAPACITY

0-200 KG/H

MAIN DIMENSIONS

LENGTH: 4000 MM

WEIGHT

APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-172-0100-M1 \*\*\* 0,75 \*\*\*  
SCREW CONVEYOR

MANUFACTURER

LOCAL

DUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 65  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
DUTCKUMPU NO :360 100 900 001 .LTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-212-0100

EQUIPMENT TYPE

TYPE  
SERVICE

AIR COOLING FAN

AXIAL FAN  
FOR PRILLING TOWER

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

75000 NM3/H  
350 PA  
35 C  
APPRCX.0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-212-0100-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

MANUFACTURER

LOCAL

320-212-0200

EQUIPMENT TYPE

TYPE  
SERVICE

AIR COOLING FAN

AXIAL FAN  
FOR PRILLING TOWER

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

75000 NM3/H  
350 PA  
35 C  
APPRCX.0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 320-212-0200-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

MANUFACTURER

LOCAL

CUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 66  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
CUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-212-0300

EQUIPMENT TYPE

AIR COOLING FAN

TYPE  
SERVICE

AXIAL FAN  
FOR PRILLING TOWER

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

75000 NM3/H  
350 PA  
35 C  
APPROX.0,5 T

MOTOR NO./RATING (Kw)  
MOTOR TITLE

\*\*\* 320-212-0300-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

MANUFACTURER

LCCAL

320-212-0400

EQUIPMENT TYPE

AIR COOLING FAN

TYPE  
SERVICE

AXIAL FAN  
FOR PRILLING TOWER

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

75000 NM3/H  
350 PA  
35 C  
APPROX.0,5 T

MOTOR NO./RATING (Kw)  
MOTOR TITLE

\*\*\* 320-212-0400-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

MANUFACTURER

LCCAL



GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 67  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-214-0100

EQUIPMENT TYPE

AIR BLOWER

TYPE  
SERVICE

CENTRIFUGAL  
FOR PRILLING TOWER

CAPACITY  
PRESSURE  
TEMPERATURE  
WEIGHT

2000 M<sup>3</sup>/H  
10 KPA  
35 C  
APPROX. 0,4 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-214-0100-M1 \*\*\* 11 \*\*\*  
AIR BLOWER

MANUFACTURER

LOCAL

320-244-0100

EQUIPMENT TYPE

GRAVITY FILTER

TYPE  
SERVICE

GLASS WOOL FILTER  
FOR SULPHUR

VOLUME  
DIMENSIONS

10 M<sup>3</sup>  
L X W X H :  
8 X 2 X 0,65 M  
APPROX. CONCRETE 8 M<sup>3</sup>, STEEL 4 T  
CONCRETE, STEEL COVER  
STEAM HEATING PIPES

WEIGHT  
MATERIAL

MANUFACTURER

LOCAL

REMARKS

STEAM HEATED

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 68  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-244-0200

EQUIPMENT TYPE

GRAVITY FILTER

TYPE  
SERVICE

GLASS WOOL FILTER(STEAM HEATED)  
FOR SULPHUR

VOLUME  
DIMENSIONS

10 M3  
L X W X H :  
8 X 2 X 0,65 M

WEIGHT  
MATERIAL

APPROX. CONCRETE 8 M3, STEEL 4 T  
CONCRETE  
STEAM HEATING PIPES

MANUFACTURER

LOCAL

REMARKS

STEAM HEATED

320-370-0100

EQUIPMENT TYPE

PUMP

I

TYPE  
SERVICE

SULPHUR PUMP  
FROM PUMP TANK TO GRAVITY FILTER

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
25 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0100-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 69  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-0200

EQUIPMENT TYPE PUMP

I

TYPE SERVICE SULPHUR PUMP ( STAND BY )  
FROM PUMP TANK TO GRAVITY FILTER

CAPACITY 25 M3/H  
HEAD 25 M  
WEIGHT APPROX. 0,5 T

MOTOR NO./RATING (KW) \*\*\*320-370-0200-M1 \*\*\* 11 \*\*\*  
MOTOR TITLE SULPHUR PUMP

MANUFACTURER FOREIGN

REMARKS STEAM HEATED

320-370-0300

EQUIPMENT TYPE PUMP

TYPE SERVICE SULPHUR PUMP  
FROM PUMP TANK TO CIRCULATION TANK

CAPACITY 50 M3/H  
HEAD 25 M  
WEIGHT APPROX. 0,7 T

MOTOR NO./RATING (KW) \*\*\*320-370-0300-M1 \*\*\* 18,5 \*\*\*  
MOTOR TITLE SULPHUR PUMP

MANUFACTURER FOREIGN

REMARKS STEAM HEATED

OUTCKUMPU BY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 70  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-0400

EQUIPMENT TYPE

PUMP

I

TYPE  
SERVICE

SULPHUR PUMP ( STAND BY )  
FROM PUMP TANK TO CIRCULATION TANK

CAPACITY  
HEAD  
WEIGHT

50 M<sup>3</sup>/H  
25 M  
APPROX. 0,7 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0400-M1 \*\*\* 18,5 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-0500

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP  
FROM PUMP TANK TO CIRCULATION TANK

CAPACITY  
HEAD  
WEIGHT

5 M<sup>3</sup>/H  
25 M  
APPROX. 0,3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0500-M1 \*\*\* 3 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 71  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-370-0600

EQUIPMENT TYPE

PUMP

I

TYPE  
SERVICE

SULPHUR PUMP ( STAND BY )  
FROM PUMP TANK TO CIRCULATION TANK

CAPACITY  
HEAD  
WEIGHT

5 M3/H  
25 M  
APPRX. 0,3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0600-M1 \*\*\* 3 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-0700

EQUIPMENT TYPE

PUMP

I

TYPE  
SERVICE

SULPHUR PUMP  
FROM CIRCULATION TANK TO  
AGGLMERATOR BED WASH

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
35 M  
APPRX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0700-M1 \*\*\* 15 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

OUTGKUMPU BY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 72  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTGKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-0800

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP ( STAND BY )  
FROM CIRCULATION TANK TO  
AGGLOMERATER BED WASH

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
35 M  
APPRX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0800-M1 \*\*\* 15 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-0900

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP  
FROM CIRCULATION TANK TO SULPHUR  
TANK

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
25 M  
APPRX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0900-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 73  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-1000

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP ( STAND BY )  
FROM CIRCULATION TANK TO SULPHUR  
TANK

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
25 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1000-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-1100

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP  
FOR AUTOCLAVES

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
35 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1100-M1 \*\*\* 15 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 74  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
GUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-1200

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP ( STAND BY )  
FOR AUTOCLAVES

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
35 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1200-M1 \*\*\* 15 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-1300

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP  
FROM PUMP TANK TO SULPHUR DAY TANK

CAPACITY  
HEAD  
WEIGHT

25 M3/H  
25 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1300-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED



JUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 75  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
JUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-1400

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR PUMP ( STAND BY )  
FROM PUMP TANK TO SULPHUR DAY TANK

CAPACITY  
HEAD  
WEIGHT

25 M<sup>3</sup>/H  
25 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1400-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-1500

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR CIRCULATION PUMP  
FOR SULPHUR COOLING BOILER

CAPACITY  
HEAD  
WEIGHT

240 M<sup>3</sup>/H  
40 M  
APPROX. 1,3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1500-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

BUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 76  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
BUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-1600

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR CIRCULATION PUMP  
FOR SULPHUR COOLING BOILER

CAPACITY  
HEAD  
WEIGHT

240 M3/H  
40 M  
APPRCX. 1.3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1600-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-1700

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR CIRCULATION PUMP  
FOR SULPHUR COOLING BOILER

CAPACITY  
HEAD  
WEIGHT

240 M3/H  
40 M  
APPRCX. 1.3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1700-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 77  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-1800

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR CIRCULATION PUMP  
FOR SULPHUR COOLING BOILER

CAPACITY  
HEAD  
WEIGHT

240 M<sup>3</sup>/H  
40 M  
APPRX. 1,3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1800-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-1900

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR CIRCULATION PUMP  
FOR SULPHUR COOLING BOILER

CAPACITY  
HEAD  
WEIGHT

240 M<sup>3</sup>/H  
40 M  
APPRX. 1,3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1900-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

CUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 78  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
CUTCKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-2000

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

SULPHUR CIRCULATION PUMP  
FOR SULPHUR COOLING BOILER

CAPACITY  
HEAD  
WEIGHT

240 M3/H  
40 M  
APPROX. 1.3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-2000-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-370-2300

EQUIPMENT TYPE

PUMP

SERVICE

SULPHUR PRILLING PUMP

CAPACITY  
PRESSURE  
WEIGHT

22 M3/H  
1600 KPA  
APPROX. 1 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-2300-M1 \*\*\* 37 \*\*\*  
SULPHUR PRILLING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 79  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-2400

EQUIPMENT TYPE

PUMP

TYPE  
SERVICE

STAND BY  
SULPHUR PRILLING PUMP

CAPACITY  
PRESSURE  
WEIGHT

22 M3/H  
1600 KPA  
APPRCX. 1 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-2400-M1 \*\*\* 37 \*\*\*  
SULPHUR PRILLING PUMP

MANUFACTURER

FOREIGN

REMARKS

STEAM HEATED

320-371-0100

EQUIPMENT TYPE

DOSSAGE PUMP

TYPE  
SERVICE

PISTON TYPE  
FOR LIME MILK

CAPACITY  
PRESSURE  
WEIGHT

0-2,5 M3/H  
400 KPA  
APPRCX. 0,1 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-371-010 -M1 \*\*\* 1,5 \*\*\*  
DOSSAGE PUMP

MANUFACTURER

LOCAL

DUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 80  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
DUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-371-0200

EQUIPMENT TYPE

DOSEAGE PUMP

TYPE  
SERVICE

PISTON TYPE  
FOR LIME MILK

CAPACITY  
PRESSURE  
WEIGHT

0-2,5 M3/H  
400 KPA  
APPRX.0,1 T

MOTOR NO./RATING (Kw)  
MOTOR TITLE

\*\*\*320-371-0200-M1 \*\*\* 1,5 \*\*\*  
DOSEAGE PUMP

MANUFACTURER

LOCAL

320-371-0300

EQUIPMENT TYPE

DOSEAGE PUMP

TYPE  
SERVICE

STAND BY  
FOR LIME MILK

CAPACITY  
PRESSURE  
WEIGHT

0-2,5 M3/H  
400 KPA  
APPRX. 0,1 T

MOTOR NO./RATING (Kw)  
MOTOR TITLE

\*\*\*320-371-0300-M1 \*\*\* 1,5 \*\*\*  
DOSEAGE PUMP

MANUFACTURER

LOCAL

LUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPOCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 81  
DEPARTMENT : PROJECT

CLIENT : PPOCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
LUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-411-0100

EQUIPMENT TYPE  
SERVICE

VIBRATING SCREEN  
FOR FILLLED SULPHUR

CAPACITY

150 T/H

MATERIAL

CARBON STEEL

WEIGHT

APPROX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-411-0100-M1 \*\*\* 15 \*\*\*  
VIBRATING SCREEN

MANUFACTURER

LOCAL

320-411-0200

EQUIPMENT TYPE  
SERVICE

VIBRATING SCREEN  
FOR FILLLED SULPHUR

CAPACITY

150 T/H

MATERIAL

CARBON STEEL

WEIGHT

APPROX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-411-0200-M1 \*\*\* 15 \*\*\*  
VIBRATING SCREEN

MANUFACTURER

LOCAL

320-509-0100

EQUIPMENT TYPE  
SERVICE

PHILLING TOWER  
SULPHUR PHILLING TOWER

DIMENSIONS

DIAMETER 30000 MM, HEIGHT 40000 MM  
WALL THICKNESS 300 MM  
CONCRETE APPROX. 1500 M3

MATERIAL

MANUFACTURER

LOCAL

JUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-26 PAGE NO: 82  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATN8)  
JUTCKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-511-0100

EQUIPMENT TYPE

AUTOCLAVE

SERVICE

SULPHUR WASHING

CAPACITY  
VOLUME  
TEMPERATURE  
PRESSURE

SULPHUR 30 T/H  
26 M3  
130 C (AUTOCLAVE)  
3,5 BAR (AUTOCLAVE)

FLOW RATE

STEAM 0,8 T/H PRESSURE 5,5 BAR  
LIME MILK 2,0 M3/H  
D = 1.5 M L = 15 M

MAIN DIMENSIONS

MATERIAL  
WEIGHT

ACID PROOF STEEL  
AUTOCLAVE&TANKS:7T, SUPPORTS:5T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-511-0100-M1 \*\*\* 3 \*\*\*  
AUTOCLAVE  
\*\*\*320-511-0100-M2 \*\*\* 3 \*\*\*  
AUTOCLAVE

MANUFACTURER

FOREIGN

REMARKS

INCLUDING: AGITATORS, SEPARATORS,  
TANKS.



CUTKUMPU DY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 83  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
CUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-511-0200

EQUIPMENT TYPE

AUTOCCLAVE

SERVICE

SULPHUR WASHING

CAPACITY

SULPHUR 30 T/H

VOLUME

26 M3

TEMPERATURE

130 C (AUTOCCLAVE)

PRESSURE

3,5 BAR (AUTOCCLAVE)

FLOW RATE

STEAM 0,8 T/H PRESSURE 5,5 BAR

MAIN DIMENSIONS

LIME MILK 2,0 M3/H

D = 1.5 M L = 15 M

MATERIAL  
WEIGHT

ACID PROOF STEEL

AUTOCCLAVE&TANKS:7T, SUPPORTS:5T

MOTOR NO./RATING (KW)

\*\*\*320-511-0100-M1 \*\*\* 3 \*\*\*

MOTOR TITLE

AUTOCCLAVE

\*\*\*320-511-0100-M2 \*\*\* 3 \*\*\*

AUTOCCLAVE

MANUFACTURER

FOREIGN

REMARKS

INCLUDING: AGITATORS, SEPARATORS,  
TANKS.

DUTOKUMPUJY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 84  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTCKJMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-515-0100

EQUIPMENT TYPE

SERVICE

VOLUME  
WEIGHT  
MATERIAL

MANUFACTURER

REMARKS

MEASURING TANK

SULPHUR MEASURING TANK

2 X 6 M3  
APPROX. 12 T  
CONCRETE, 4 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING VALVES AND STEEL COVERS

320-516-0100

EQUIPMENT TYPE

SERVICE

VOLUME  
MATERIAL  
WEIGHT

MOTOR NO./RATING (KW)  
MOTOR TITLE

MANUFACTURER

MIXING TANK

FOR LIME MILK

25 M3  
STEEL  
APPROX. 4 T

\*\*\*320-516-0100-M1 \*\*\* 4 \*\*\*  
MIXING TANK

LOCAL

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 85  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT : EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO : 360 100 900 001 ALT1  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-518-0100

EQUIPMENT TYPE

SERVICE

CAPACITY  
VOLUME  
MATERIAL

MANUFACTURER

REMARKS

PUMP TANK

LIQUID SULPHUR CIRCULATING TANK

2600 T/H  
95 M3  
CONCRETE, APPR. 30 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING STEEL COVERS

320-518-0200

EQUIPMENT TYPE

SERVICE

VOLUME  
MATERIAL

MANUFACTURER

REMARKS

PUMP TANK

SULPHUR PUMP TANK  
FOR SULPHUR CONDENSING BOILERS

18 M3  
CONCRETE, 6 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING STEEL COVERS

DUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 86  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-518-0300

EQUIPMENT TYPE

SERVICE

VOLUME  
MATERIAL

MANUFACTURER

REMARKS

PUMP TANK

SULPHUR PUMP TANK  
FOR DEMISTER

18 M3  
CONCRETE, 6 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING STEEL COVERS

320-518-0400

EQUIPMENT TYPE

SERVICE

VOLUME  
MATERIAL

MANUFACTURER

REMARKS

PUMP TANK

SULPHUR PUMP TANK  
FOR EXHAUST GAS FANS

10 M3  
CONCRETE, 3 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING STEEL COVERS

OUTKUMPU LY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 87  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTKUMPU NO : 360 100 900 001 ALT1  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-518-0500

EQUIPMENT TYPE

SERVICE

VOLUME  
MATERIAL

MANUFACTURER

REMARKS

PUMP TANK

SULPHUR PUMP TANK  
FOR AUTOCLAVES

18 M3  
CONCRETE, 6 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING STEEL COVERS

320-518-0600

EQUIPMENT TYPE

SERVICE

VOLUME  
MATERIAL

MANUFACTURER

REMARKS

PUMP TANK

SULPHUR PUMP TANK  
FOR SULPHUR DAY TANK

18 M3  
CONCRETE 6 M3  
STEAM HEATING PIPES

LOCAL

INCLUDING STEEL COVERS

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 88  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-518-0700

EQUIPMENT TYPE

PUMP TANK

SERVICE

SULPHUR PUMP TANK  
FOR SULPHUR PRILLING

VOLUME  
MATERIAL

18 M3  
CONCRETE, 6 M3  
STEAM HEATING PIPES

MANUFACTURER

LCCAL

REMARKS

INCLUDING STEEL COVERS

320-519-0100

EQUIPMENT TYPE

TANK

SERVICE

SULPHUR TANK  
FOR AUTOCLAVES FEED TANK

VOLUME  
WEIGHT  
MATERIAL

100 M3  
APPROX. 92 T  
STEEL  
STEAM HEATING PIPES

MANUFACTURER

LCCAL

REMARKS

INCLUDING STEEL COVERS

OUTOKUMPU CYZ ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 89  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-519-0200

EQUIPMENT TYPE

DAY TANK

SERVICE

SULPHUR DAY TANK

VOLUME  
WEIGHT  
MATERIAL

400 M3  
APPROX. 240 T  
STEEL  
STEAM HEATING PIPES

MANUFACTURER

LCCAL

REMARKS

INCLUDING STEEL COVERS

330-----0

EQUIPMENT TYPE

WASTE LIQUID HANDLING AREA

330-212-0100

EQUIPMENT TYPE

FAN

TYPE  
SERVICE

CENTRIFUGAL  
EXHAUST GAS FAN

CAPACITY  
PRESSURE

5000 NM3/H  
500 PA

MATERIAL

CARBON STEEL, RUBBER LINED

WEIGHT

APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-212-0100-M1 \*\*\* 5,5 \*\*\*  
EXHAUST GAS FAN

MANUFACTURER

LCCAL

BUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 90  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

330-243-0100

EQUIPMENT TYPE

DRUM FILTER

SERVICE

FCF ARSENIC PRECIPITATE

FILTER AREA  
WEIGHT

4,5 M2  
APPRCX. 1 T

MATERIAL

ACID PROOF STEEL

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-243-0100-M1 \*\*\* 1,1 \*\*\*  
DRUM FILTER  
\*\*\*330-243-0100-M2 \*\*\* 0,75 \*\*\*  
DRUM FILTER

MANUFACTURER

LCCAL

REMARKS

VACUUM: 500 MM HG

330-370-0100

EQUIPMENT TYPE

PUMP

SERVICE

UNDERFLOW PUMP FOR SULPHUR  
WASHING WASTE WATER THICKENER

CAPACITY  
HEAD  
WEIGHT

2 M3/H  
15 M  
APPRCX. 0,2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-370-0100-M1 \*\*\* 2,2 \*\*\*  
UNDERFLOW PUMP

MANUFACTURER

LCCAL



GUTCKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRIT. SMELTER

DATE :85-08-28 PAGE NO: 91  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
GUTCKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

330-370-0200

EQUIPMENT TYPE

PUMP

SERVICE

UNDERFLOW PUMP FOR SULPHUR  
WASHING WASTE WATER THICKENER

CAPACITY  
HEAD  
WEIGHT

2 M3/H  
15 M  
APPRX. 0,2 T

MOTOR NO./RATING (Kw)  
MOTOR TITLE

\*\*\*330-370-0200-M1 \*\*\* 2,2 \*\*\*  
UNDERFLOW PUMP

MANUFACTURER

LOCAL

330-370-0300

EQUIPMENT TYPE

PUMP

SERVICE

OVERFLOW PUMP FOR SULPHUR  
WASHING WASTE WATER THICKENER

CAPACITY  
HEAD  
WEIGHT

15 M3/H  
20 M  
APPRX. 0,2 T

MOTOR NO./RATING (Kw)  
MOTOR TITLE

\*\*\*330-370-0300-M1 \*\*\* 2,2 \*\*\*  
OVERFLOW PUMP

MANUFACTURER

LOCAL

BUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 92  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

330-370-0400

EQUIPMENT TYPE

PUMP

SERVICE

OVERFLOW PUMP FOR SULPHUR  
WASHING WASTE WATER THICKENER

CAPACITY  
HEAD  
WEIGHT

15 M<sup>3</sup>/H  
20 M  
APPRX. 0,2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-370-0400-M1 \*\*\* 2,2 \*\*\*  
OVERFLOW PUMP

MANUFACTURER

LOCAL

330-375-0100

EQUIPMENT TYPE

VACUUM PUMP

CAPACITY  
VACUUM  
WEIGHT

4,5 M<sup>3</sup>/MIN  
UNDER PRESSURE 600 MM HG  
APPRX. 0,2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-375-0100-M1 \*\*\* 11 \*\*\*  
VACUUM PUMP

MANUFACTURER

LOCAL

330-510-0100

EQUIPMENT TYPE

TANK

SERVICE

COOLING TANK FOR WASTE LIQUID

VOLUME  
WEIGHT  
MATERIAL

5 M<sup>3</sup>  
APPRX. 1 T  
ACID PROOF STEEL

MANUFACTURER

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 93  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

330-510-0200

EQUIPMENT TYPE

TANK

SERVICE

SULPHURIC ACID TANK

VOLUME  
WEIGHT  
MATERIAL

3 M3  
APPROX. 0,8 T  
CARBON STEEL

MANUFACTURER

LCCAL

330-518-0100

EQUIPMENT TYPE

PUMP TANK

SERVICE

UNDERFLOW PUMP TANK

VOLUME  
WEIGHT  
MATERIAL

5 M3  
APPROX. 0,7 T  
ACID PROOF STEEL

MANUFACTURER

FOREIGN

330-518-0200

EQUIPMENT TYPE

PUMP TANK

SERVICE

OVERFLOW PUMP TANK

VOLUME  
WEIGHT  
MATERIAL

15 M3  
APPROX. 2,0 T  
ACID PROOF STEEL

MANUFACTURER

FOREIGN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 94  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

330-521-0100

EQUIPMENT TYPE

REACTOR TANK

VOLUME  
WEIGHT  
MATERIAL

3 M3  
APPRX. 3,5 T  
STEEL  
BRICKLINING AND RUBBER LINING

MANUFACTURER

LOCAL

330-532-0100

EQUIPMENT TYPE

THICKENER

DIMENSIONS

DIAMETER 3500 MM

VOLUME  
MATERIAL

9 M3  
STEEL , RUBBERIZED

WEIGHT

APPRX. 4 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-532-0100-M1 \*\*\* 2 \*\*\*  
THICKENER  
\*\*\*330-532-0100-M2 \*\*\* 0,75 \*\*\*  
THICKENER

MANUFACTURER

LOCAL

500-----0

EQUIPMENT TYPE

COAL PLANT AREA

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 95  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE .22.08.85

500-118-0100

EQUIPMENT TYPE

SERVICE

CAPACITY

MATERIAL

WEIGHT

MANUFACTURER

STORAGE BIN

RAW COAL STORAGE BIN

400 M3

CARBON STEEL

APPROX. 60 T

LOCAL

500-118-0200

EQUIPMENT TYPE

SERVICE

VOLUME

MATERIAL

WEIGHT

MANUFACTURER

STORAGE BIN

RAW COAL STORAGE BIN

400 M3

CARBON STEEL

APPROX. 60 T

LOCAL

500-118-0300

EQUIPMENT TYPE

SERVICE

CAPACITY

MATERIAL

WEIGHT

MANUFACTURER

STORAGE BIN

FGF PULVERIZED COAL

400 M3

CARBON STEEL

APPROX. 60 T

LOCAL

BUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 96  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
BUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-118-0400

EQUIPMENT TYPE

STORAGE BIN

SERVICE

FOR SUPERHEATER COAL

CAPACITY

20 M3

MATERIAL

CARBON STEEL

WEIGHT

APPROX. 6 T

MANUFACTURER

LOCAL

500-133-0100

EQUIPMENT TYPE

OIL BURNER

SERVICE

START UP BURNER FOR AIR PREHEATER

WEIGHT

APPROX. 0,5 T

MANUFACTURER

LOCAL

500-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

SERVICE

RAW COAL TRANSPORT TO STORAGE BINS

CAPACITY

200 T/H

MAIN DIMENSIONS

LENGTH: 75 M

BELT WIDTH

800 MM

BELT INCLINE

12 DEGREES

WEIGHT

APPROX. 6 T

MOTOR NO./RATING (KW)

\*\*\*500-167-0100-M1 \*\*\* 45 \*\*\*

MOTOR TITLE

BELT CONVEYOR

MANUFACTURER

LOCAL

CUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 97  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
CUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-167-0200

EQUIPMENT TYPE

BELT CONVEYOR

TYPE  
SERVICE

REVERSIBLE  
RAW COAL TRANSPORT TO STORAGE BINS

CAPACITY

200 T/H

MAIN DIMENSIONS

LENGTH: 9000 MM

BELT WIDTH

800 MM

BELT INCLINE

NONE

WEIGHT

APPROX. 1 T

MOTOR NO./RATING (KW)

\*\*\*500-167-0200-M1 \*\*\* 7.5 \*\*\*

MOTOR TITLE

BELT CONVEYOR

MANUFACTURER

LCCAL

500-170-0100

EQUIPMENT TYPE

PNEUMATIC CONVEYOR SYSTEM

SERVICE

TRANSPORT OF PULVERIZED COAL TO  
FEED BINS

INCLUDING

FEEDERS, PIPING, DUST SEPARATION EQ.

CAPACITY

30 T/H

WEIGHT

APPROX. 8 T

MANUFACTURER

FOREIGN

BUTOKUMPU DY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 98  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-170-0200

EQUIPMENT TYPE

PNEUMATIC CONVEYOR SYSTEM

SERVICE

TRANSPORT OF PULVERIZED COAL TO  
COAL BURNERS OF SUPERHEATER

INCLUDING

BIN DISCHARGERS, ROTOR SCALES,  
PIPING

CAPACITY  
WEIGHT

5 T/H  
APPRX. 8 T

MANUFACTURER

FOREIGN

500-179-0100

EQUIPMENT TYPE

COAL INJECTION SYSTEM

SERVICE

COAL INJECTION TO  
FLASH SMELTING FURNACE

INCLUDING

STORAGE INJECTORS, BIN DISCHARGERS  
PRIMARY INJECTORS, TUYERS, BINS

CAPACITY  
WEIGHT

25 T/H  
APPRX. 12 T

MANUFACTURER

FOREIGN

500-202-0100

EQUIPMENT TYPE

FEED HOPPER

SERVICE

RAW COAL FEED

VOLUME  
WEIGHT  
MATERIAL

20 M3  
APPRX. 1,5 T  
CARBON STEEL

MANUFACTURER

LOCAL



DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 99  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-212-0100

EQUIPMENT TYPE

FAN

TYPE  
SERVICE

CENTRIFUGAL  
HOT AIR SYSTEM FOR MILLS

WEIGHT

APPROX. 0,6 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 500-212-0100-M1\*\*\* 30 \*\*\*  
FAN

MANUFACTURER

500-212-0200

EQUIPMENT TYPE

FAN

TYPE  
SERVICE

CENTRIFUGAL  
EXHAUST FAN

CAPACITY

GAS FLOW: 80 000 NM3  
PRESSURE: 7 KPA

WEIGHT

APPROX. 5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 500-212-0200-M1\*\*\* 250 \*\*\*  
FAN

MANUFACTURER

LOCAL

DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 100  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

500-212-0300

EQUIPMENT TYPE

EXHAUST AIR FAN

SERVICE

FOR PNEUMATIC CONVEYOR SYSTEM

WEIGHT

APPRX. 0,3 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-212-030-M1 \*\*\*- 22 \*\*\*  
FAN

MANUFACTURER

FOREIGN

500-212-0400

EQUIPMENT TYPE

FAN

SERVICE

EXHAUST AIR FAN FOR PNEUMATIC  
CONVEYOR SYSTEM.

WEIGHT

APPRX. 0,2 T

MOTOR NO./RATING (KW)

\*\*\*500-212-0400-M1 \*\*\* .1 \*\*\*

MANUFACTURER

FOREIGN

500-216-0100

EQUIPMENT TYPE

AIR LOCK FEEDER

SERVICE

COAL BIN DISCHARGER

CAPACITY  
WEIGHT

MATERIAL FLOW: 30 T/H  
APPRX. 0,1 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-216-0100-M1 \*\*\* 2,2 \*\*\*  
AIR LOCK FEEDER

MANUFACTURER

LCCAL

CUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYFITE SMELTER

DATE :85-08-28 PAGE NO: 101  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
CUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-216-0200

EQUIPMENT TYPE

AIR LOCK FEEDER

SERVICE

CCAL BIN DISCHARGER

CAPACITY  
WEIGHT

MATERIAL FLOW: 30 T/H  
APPCX. 0,1 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-216-0200-M1 \*\*\* 2,2 \*\*\*  
AIR LOCK FEEDER

MANUFACTURER

LCCAL

500-218-0100

EQUIPMENT TYPE

BELT FEEDER

SERVICE

RAW CCAL FEED

CAPACITY

200 T/H

BELT LENGTH  
BELT WIDTH  
BELT INCLINE  
WEIGHT

5000 MM  
1000 MM  
HORIZONTAL  
APPCX. 3,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-218-0100-M1 \*\*\* 7.5 \*\*\*  
BELT FEEDER

MANUFACTURER

LCCAL

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 102  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-223-0100

EQUIPMENT TYPE

DRAG FEEDER

SERVICE

FEEDING COAL MILL

CAPACITY

6...30 T/H

MAIN DIMENSIONS

LENGTH: 6000 MM

WIDTH: 1000 MM

WEIGHT

APPRX. 5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-223-0100-M1 \*\*\* 7,5 \*\*\*  
DRAG FEEDER

MANUFACTURER

FOREIGN

500-223-0200

EQUIPMENT TYPE

DRAG FEEDER

SERVICE

FEEDING COAL MILL, STAND-BY

CAPACITY

6...30 T/H

MAIN DIMENSIONS

LENGTH: 6000 MM

WIDTH: 1000 MM

WEIGHT

APPRX. 5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-223-0200-M1 \*\*\* 7,5 \*\*\*  
DRAG FEEDER

MANUFACTURER

FOREIGN

500-281-0100

EQUIPMENT TYPE

PREHEATER

TYPE  
SERVICE

AIR PREHEATER  
HOT AIR SYSTEM FOR MILLS

MATERIAL  
WEIGHT

STEEL MANTLE, REFRACTORY CASTABLE  
APPRX. 4 T (TOTAL)

MANUFACTURER

FOREIGN

GUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 103  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
GUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

500-325-0100

EQUIPMENT TYPE

SERVICE

CAPACITY  
WEIGHT

CONSTRUCTION

MOTOR NO./RATING (KW)  
MOTOR TITLE

MANUFACTURER

500-325-0200

EQUIPMENT TYPE

SERVICE

CAPACITY  
WEIGHT

CONSTRUCTION

MOTOR NO./RATING (KW)  
MOTOR TITLE

MANUFACTURER

500-411-0100

EQUIPMENT TYPE

SERVICE

CAPACITY  
WEIGHT

MOTOR NO./RATING (KW)  
MOTOR TITLE

MANUFACTURER

MILL

COAL MILL

30 T/H  
APPROX. 35 T

VERTICAL POSITION

\*\*\*500-325-0100-M1 \*\*\* 315 \*\*\*  
MILL

FOREIGN

MILL

COAL MILL (STAND BY)

30 T/H  
APPROX. 35 T

VERTICAL POSITION

\*\*\*500-325-0200-M1 \*\*\* 315 \*\*\*  
MILL

FOREIGN

VIBRATING SCREEN

FOR PULVERIZED COAL

30 T/H  
APPROX. 2 T

\*\*\*500-411-0100-M1 \*\*\* 2,2 \*\*\*  
VIBRATING SCREEN

FOREIGN

BUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 104  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

500-411-0200

EQUIPMENT TYPE

VIBRATING SCREEN

SERVICE

FOR PULVERIZED COAL

CAPACITY  
WEIGHT

30 T/H  
APPRX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-411-0200-M1 \*\*\* 2.2 \*\*\*  
VIBRATING SCREEN

MANUFACTURER

FOREIGN

500-417-0100

EQUIPMENT TYPE

BAG FILTER

SERVICE

COAL DUST SEPARATION

WEIGHT

APPRX. 5.5 T

MANUFACTURER

FOREIGN

500-419-0100

EQUIPMENT TYPE

CYCLONE

SERVICE

FOR COAL DUST SEPARATION

WEIGHT

APPRX. 3 T

MANUFACTURER

FOREIGN

600-----0

EQUIPMENT TYPE

POWER PLANT AREA

BUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 105  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (4TNB)  
BUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

600-122-0100

EQUIPMENT TYPE

SERVICE

CAPACITY

WEIGHT

MANUFACTURER

AUXILIARY BOILER

HEATING OF SULPHUR PLANT IN  
START-UP AND SHUT-DOWN CASES

SATURATED STEAM 15 T/H

APPROX. 60 T

LOCAL

600-123-0100

EQUIPMENT TYPE

SERVICE

CAPACITY

PRESSURE

TEMPERATURE

WEIGHT

MANUFACTURER

SUPERHEATING BOILER

SUPERHEAT WASTE HEAT BOILER STEAM

SUPERHEATED STEAM: 100 T/H

65 BAR

480 DEGREES C.

FUEL. COAL, IN START-UP LIGHT OIL  
APPROX. 150 T

LOCAL

600-276-0100

EQUIPMENT TYPE

TYPE  
SERVICE

CAPACITY

MANUFACTURER

CONDENSER

DUMP CONDENSER  
CONDENSING OF TURBOALTERNATOR  
STEAM

100 T/H

LOCAL

DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 106  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

600-280-0100

EQUIPMENT TYPE

SERVICE

HEAT EXCHANGER

PREHEATING OF BOILER FEED WATER

CAPACITY

20 T/H

MANUFACTURER

LOCAL

600-280-0200

EQUIPMENT TYPE

SERVICE

HEAT EXCHANGER

COOLING OF LOW PRESSURE (1,7BAR)  
BOILERS FEED WATER.

CAPACITY

20 T/H

MANUFACTURER

LOCAL

600-376-0100

EQUIPMENT TYPE

SERVICE

CONDENSATE PUMP

PUMPING OF TURBOALTERNATOR  
CONDENSATE.

CAPACITY

100 T/H

HEAD

50 M

WEIGHT

APPROX. 0,5 T

MOTOR NO./RATING (KW)

\*\*\*600-376-0100-MI \*\*\* 22 \*\*\*

MOTOR TITLE

CONDENSATE PUMP

MANUFACTURER

LOCAL



BUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 107  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
BUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

600-376-0200

EQUIPMENT TYPE

CONDENSATE PUMP

SERVICE

PUMPING OF SULPHUR PLANT  
BOILER CONDENSATE.

CAPACITY  
HEAD  
WEIGHT

50 T/H  
50 M  
APPROX. 0,5 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0200-M1 \*\*\* 22 \*\*\*  
CONDENSATE PUMP

MANUFACTURER

LOCAL

600-376-0300

EQUIPMENT TYPE

CONDENSATE PUMP

SERVICE

FEED WATER PUMP FOR WASTE  
HEAT BOILER.

CAPACITY  
HEAD  
WEIGHT

140 T/H  
800 M  
APPROX. 2 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0300-M1 \*\*\* 400 \*\*\*  
CONDENSATE PUMP

MANUFACTURER

LOCAL

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 108  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: EQUIPMENT LIST (ATN8)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

600-375-0400

EQUIPMENT TYPE

CONDENSATE PUMP

SERVICE

FEED WATER PUMP FOR WASTE  
HEAT BOILER (STAND-BY)

CAPACITY  
HEAD  
WEIGHT

120 T/H  
800 M  
APPRX.1,5 T

MANUFACTURER

LCCAL

REMARKS

TURBINE DRIVEN

600-376-0500

EQUIPMENT TYPE

CONDENSATE PUMP

SERVICE

FEED WATER PUMP FOR SULPHUR  
PLANT BOILERS.

CAPACITY  
HEAD  
WEIGHT

75 T/H  
75 M  
APPRX.0,4 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0500-M1 \*\*\* 30 \*\*\*  
FEED WATER PUMP

MANUFACTURER

LCCAL

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 109  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

600-376-0600

EQUIPMENT TYPE

CONDENSATE PUMP

TYPE  
SERVICE

TURBINE DRIVEN  
FEED WATER PUMP FOR SULPHUR  
PLANT BOILERS (STAND-BY)

CAPACITY  
HEAD  
WEIGHT

75 T/H  
75 M  
APPRX. 0.4 T

MANUFACTURER

LOCAL

600-376-0700

EQUIPMENT TYPE

CONDENSATE PUMP

SERVICE

FEED WATER PUMP FOR AUXILIARY  
BOILER

CAPACITY  
HEAD  
WEIGHT

20 T/H  
130 M  
APPRX. 0.4 T

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0700-M1 \*\*\* 15 \*\*\*  
FEED WATER PUMP

MANUFACTURER

LOCAL

OUTCKUMPU BY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 110  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
OUTCKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

600-514-0100

EQUIPMENT TYPE

FEED TANK

TYPE  
SERVICE

FEED WATER TANK  
FOR WASTE HEAT BOILER AND  
SULPHUR PLANT BOILERS.

CAPACITY

VOLUME: 175 M3

WEIGHT

PRESSURE: 5 BAR  
APPRX. 100 T

MANUFACTURER

LOCAL

600-556-0100

EQUIPMENT TYPE

TURBOALTERNATOR

TYPE  
SERVICE

CONDENSATE TYPE TURBINE  
PRODUCTION OF ELECTRIC POWER

CAPACITY

25 MW ELECTRIC POWER

MANUFACTURER

FOREIGN

DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 111  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: EQUIPMENT LIST (ATNB)  
DUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

700-----0

EQUIPMENT TYPE

OXYGEN PLANT AREA

MANUFACTURER

FOREIGN

800-----0

EQUIPMENT TYPE

LIME STONE SLURRY PREPARATION

MANUFACTURER

LOCAL

900-----0

EQUIPMENT TYPE

WATER TREATMENT AREA

GUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 112  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:EQUIPMENT LIST (ATNB)  
GUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

950-----0

EQUIPMENT TYPE

COMPRESSED AIR STATION

MANUFACTURER

LOCAL



4.3.2  
Motor List

In Volume II

DUTCKUMPU DY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 1  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
DUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

200-----0

EQUIPMENT TYPE

FLASH SMELTER AREA

210-----0

EQUIPMENT TYPE

DRYER AND FSF FEED AREA

210-116-0100

EQUIPMENT TYPE

CONCENTRATE DAY BIN

210-116-0200

EQUIPMENT TYPE

CONCENTRATE DAY BIN

210-116-0300

EQUIPMENT TYPE

CONCENTRATE DAY BIN

210-116-0400

EQUIPMENT TYPE

DAY BIN

210-117-0100

EQUIPMENT TYPE

DRYED CHARGE BIN

210-117-0200

EQUIPMENT TYPE

DRYED CHARGE BIN



BUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 2  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
BUTCKUMPU NO :340 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-167-0100

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

BELT CONVEYOR

\*\*\* 210-167-0100-M1\*\*\* 4 \*\*\*  
BELT CONVEYOR

210-167-0200

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

BELT CONVEYOR

\*\*\* 210-167-0200-M1\*\*\* 11 \*\*\*  
BELT CONVEYOR

210-167-0300

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

BELT CONVEYOR

\*\*\*210-167-0300-M1 \*\*\* 3.0 \*\*\*  
BELT CONVEYOR

210-168-0100

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

DRAG CONVEYOR

\*\*\*210-168-0100-M1 \*\*\* 7,5 \*\*\*  
DRAG CONVEYOR

210-168-0200

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

DRAG CONVEYOR

\*\*\*210-168-0200-M1 \*\*\* 7,5 \*\*\*  
DRAG CONVEYOR

GUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 3  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
GUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-170-0100

EQUIPMENT TYPE

PNEUMATIC CONVEYOR SYSTEM

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-170-0100-M1 \*\*\* 132 \*\*\*  
AIR BLOWER  
\*\*\*210-170-0100-M2 \*\*\* 132 \*\*\*  
AIR BLOWER,STAND BY  
\*\*\*210-170-0100-M3 \*\*\* 1,1 \*\*\*  
AIR LOCK  
\*\*\*210-170-0100-M4 \*\*\* 1,1  
AIR LOCK  
\*\*\*210-170-0100-M5 \*\*\* 5 \*\*\*  
RETURN AIR FAN

210-194-0100

EQUIPMENT TYPE

MULTICICIL DRYER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-194-0100-M1\*\*\* 160 \*\*\*  
MULTICICIL DRYER

210-194-0200

EQUIPMENT TYPE

MULTICICIL DRYER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-194-0200-M1 \*\*\* 160 \*\*\*  
MULTICICIL DRYER

210-212-0100

EQUIPMENT TYPE

EXHALST AIR FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-212-0100-M1 \*\*\* 45 \*\*\*  
EXHAUST AIR FAN

210-218-0100

EQUIPMENT TYPE

BELT FEEDER FOR CONCENTRATE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-218-0100-M1\*\*\* 7,5 \*\*\*  
BELT FEEDER

JUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 4  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (8)  
JUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

210-218-0200

EQUIPMENT TYPE

BELT FEEDER FOR CONCENTRATE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-218-0200-M1\*\*\* 7,5 \*\*\*  
BELT FEEDER

210-218-0300

EQUIPMENT TYPE

BELT FEEDER FOR CONCENTRATE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 210-218-0300-M1\*\*\* 7,5 \*\*\*  
BELT FEEDER

210-218-0400

EQUIPMENT TYPE

BELT FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-218-0400-M1 \*\*\* 3,0 \*\*\*  
BELT FEEDER

210-411-0100

EQUIPMENT TYPE

VIBRATING SCREEN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*210-411-0100-M1 \*\*\* 15 \*\*\*  
VIBRATING SCREEN

210-417-0100

EQUIPMENT TYPE

BAG FILTER

220-----0

EQUIPMENT TYPE

FLASH SMELTING FURNACE AREA

220-108-0100

EQUIPMENT TYPE

GRANULATION BASIN

GUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 5  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (8)  
GUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-108-0200

EQUIPMENT TYPE

GRANULATION BASIN

220-131-0100

EQUIPMENT TYPE

CCAL DUST BURNER

220-131-0200

EQUIPMENT TYPE

CCAL DUST BURNER

220-131-0300

EQUIPMENT TYPE

CCAL DUST BURNER

220-131-0400

EQUIPMENT TYPE

CCAL DUST BURNER

220-131-0500

EQUIPMENT TYPE

CCAL DUST BURNER

220-131-0600

EQUIPMENT TYPE

CCAL DUST BURNER

220-133-0100

EQUIPMENT TYPE

AUXILIARY BURNER

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :95-08-28 PAGE NO: 6  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.05

220-133-0200

EQUIPMENT TYPE

AUXILIARY BURNER

220-140-0100

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

220-140-0200

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

220-140-0300

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

220-140-0400

EQUIPMENT TYPE

SLAG LAUNDER WITH COVERS

220-140-0500

EQUIPMENT TYPE

GRANULATION LAUNDER

220-140-0600

EQUIPMENT TYPE

GRANULATION LAUNDER

220-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-167-0100-M1 \*\*\*11 \*\*\*  
BELT CONVEYOR

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYFITE SMELTER

DATE : 85-08-28 PAGE NO: 7  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

220-174-0100

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

RAKE CLASSIFIER

\*\*\*220-174-0100-M1 \*\*\* 11 \*\*\*  
RAKE CLASSIFIER

220-174-0200

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

RAKE CLASSIFIER

\*\*\*220-174-0200-M1 \*\*\* 11 \*\*\*  
RAKE CLASSIFIER

220-198-0100

EQUIPMENT TYPE

GAS DUCTWORK

220-198-0200

EQUIPMENT TYPE

GAS DUCTWORK

220-212-0100

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

PROCESS AIR FAN

\*\*\* 220-212-0100-M1\*\*\* 160 \*\*\*  
PROCESS AIR FAN

220-212-0200

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

PROCESS AIR FAN

\*\*\* 220-212-0200- 160 \*\*\*  
PROCESS AIR FAN

220-212-0300

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

COMBUSTION AIR FAN

\*\*\*220-212-0300-M1\*\*\* 110 \*\*\*  
COMBUSTION AIR FAN

DUTOKUMPUJY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 8  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (8)  
DUTOKUMPUJY NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-223-0100

EQUIPMENT TYPE

DRIED CHARGE DRAG FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-223-0100-M1 \*\*\* 11 \*\*\*  
DRAG FEEDER

220-223-0200

EQUIPMENT TYPE

DRIED CHARGE DRAG FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-223-0200-M1 \*\*\* 11 \*\*\*  
DRAG FEEDER

220-261-0100

EQUIPMENT TYPE

FLASH SMELTING FURNACE

220-289-0100

EQUIPMENT TYPE

JACKET WATER HEAT EXCHANGER

220-289-0200

EQUIPMENT TYPE

JACKET WATER HEAT EXCHANGER

220-289-0300

EQUIPMENT TYPE

SPRAY WATER HEAT EXCHANGER

220-289-0400

EQUIPMENT TYPE

SPRAY WATER HEAT EXCHANGER

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 9  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
OUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-318-0100

EQUIPMENT TYPE

OVERHEAD TRAVELLING CRANE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-318-0100-M1 \*\*\* 11 \*\*\*  
OVERHEAD TRAVELLING CRANE  
\*\*\*220-318-0100-M2 \*\*\* 2.2 \*\*\*  
OVERHEAD TRAVELLING CRANE  
\*\*\*220-318-0100-M3 \*\*\* 1.1 \*\*\*  
OVERHEAD TRAVELLING CRANE

220-376-0100

EQUIPMENT TYPE

JACKET WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0100-M1 \*\*\*200 \*\*\*  
JACKET WATER PUMP

220-376-0200

EQUIPMENT TYPE

JACKET WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0200-M1 \*\*\*200 \*\*\*  
JACKET WATER PUMP

220-376-0400

EQUIPMENT TYPE

SPRAY WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0400-M1 \*\*\* 90 \*\*\*  
SPRAY WATER PUMP

220-376-0500

EQUIPMENT TYPE

SPRAY WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0500-M1 \*\*\* 90 \*\*\*  
SPRAY WATER PUMP

220-376-0700

EQUIPMENT TYPE

GRANULATION WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0700-M1 \*\*\* 90 \*\*\*  
GRANULATION WATER PUMP



GUTOKUMPU BY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 10  
DEPARTMEN. :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
GUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

220-376-0800

EQUIPMENT TYPE

GRANULATION WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0800-M1 \*\*\* 90 \*\*\*  
GRANULATION WATER PUMP

220-376-0900

EQUIPMENT TYPE

GRANULATION WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*220-376-0900-M1 \*\*\* 90 \*\*\*  
GRANULATION WATER PUMP

220-435-0100

EQUIPMENT TYPE

CONCENTRATE BURNER

220-519-0100

EQUIPMENT TYPE

JACKET WATER TANK

220-519-0200

EQUIPMENT TYPE

SPRAY WATER TANK

220-519-0300

EQUIPMENT TYPE

CIL TANK

220-519-0400

EQUIPMENT TYPE

CIL TANK

220-569-0100

EQUIPMENT TYPE

EMERGENCY DAMPER BETWEEN FSF-WHB

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 11  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT: MOTOR LIST (B)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

230-----0

EQUIPMENT TYPE

PROCESS GAS HANDLING AREA

230-124-0100

EQUIPMENT TYPE

WASTE HEAT BOILER

230-198-0100

EQUIPMENT TYPE

GAS DUCTWORK

230-212-0100

EQUIPMENT TYPE

PROCESS GAS FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*230-212-0100-M1 \*\*\* 250 \*\*\*  
PROCESS GAS FAN

230-212-0200

EQUIPMENT TYPE

PROCESS GAS FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*230-220-0200-M1 \*\*\* 250 \*\*\*  
PROCESS GAS FAN

230-372-0100

EQUIPMENT TYPE

EJECTOR

230-372-0200

EQUIPMENT TYPE

EJECTOR

230-372-0300

EQUIPMENT TYPE

EJECTOR

CUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 12  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
CUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

230-376-0100

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*230-376-0100-M1 \*\*\* 200 \*\*\*  
SHB CIRCULATION WATER PUMP

230-376-0200

EQUIPMENT TYPE

WATER PUMP

230-421-0100

EQUIPMENT TYPE

ELECTROSTATIC PRECIPITATOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* SEVERAL, TOTAL \*\*\* 90 \*\*\*

230-421-0200

EQUIPMENT TYPE

ELECTROSTATIC PRECIPITATOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* SEVERAL, TOTAL \*\*\* 90 \*\*\*

230-562-0100

EQUIPMENT TYPE

DISC VALVE

230-562-0200

EQUIPMENT TYPE

DISC VALVE

240-----0

EQUIPMENT TYPE

FLUE DUST HANDLING AREA

DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 13  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (8)  
DUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

240-140-0100

EQUIPMENT TYPE

LAUNDER

240-168-0100

EQUIPMENT TYPE

DRAG CONVEYOR FOR WHB DUST

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0100-M1 \*\*\* 5,5 \*\*\*  
DRAG CONVEYOR FOR WHB DUST

240-168-0200

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0200-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

240-168-0300

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0300-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

240-168-0400

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0400-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

240-168-0500

EQUIPMENT TYPE

DRAG CONVEYOR FOR EP DUST

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-168-0500-M1 \*\*\* 3 \*\*\*  
DRAG CONVEYOR FOR EP DUST

240-209-0100

EQUIPMENT TYPE

WATER LOCK

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 14  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

240-209-0200

EQUIPMENT TYPE

WATER LOCK

240-209-0300

EQUIPMENT TYPE

WATER LOCK

240-209-0400

EQUIPMENT TYPE

WATER LOCK

240-209-0500

EQUIPMENT TYPE

WATER LOCK

240-374-0300

EQUIPMENT TYPE

SLURRY PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-374-0300-M1 \*\*\* 7.5 \*\*\*  
SLURRY PUMP

240-374-0400

EQUIPMENT TYPE

SLURRY PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-374-0400-M1 \*\*\* 7.5 \*\*\*  
SLURRY PUMP

240-376-0100

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-376-0100-M1 \*\*\* 15 \*\*\*  
WATER PUMP

OUTCUMPU BY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-09-28 PAGE NO: 15  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
OUTCUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

240-376-0200

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-376-0200-M1 \*\*\* 15 \*\*\*  
WATER PUMP

240-518-0100

EQUIPMENT TYPE

PUMP TANK

240-532-0100

EQUIPMENT TYPE

THICKENER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*240-532-0100-M1 \*\*\* 3 \*\*\*  
THICKENER  
\*\*\*240-532-0100-M2 \*\*\* 3 \*\*\*  
THICKENER  
\*\*\*240-532-0100-M3 \*\*\* 0,5 \*\*\*  
THICKENER

300-----0

EQUIPMENT TYPE

SULPHUR PLANT AREA

310-----0

EQUIPMENT TYPE

SULPHUR RECOVERING AREA

310-129-0100

EQUIPMENT TYPE

SULPHUR CONDENSING BOILER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 310-129-0100-M1\*\*\* 110 \*\*\*  
CIRCULATION WATER PUMP  
\*\*\* 310-129-0100-M2\*\*\* 90 \*\*\*  
CIRCULATION WATER PUMP

BUTCKJMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 16  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (8)  
DLTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-129-0200

EQUIPMENT TYPE

MOTOR NO./RATING (KW)  
MOTOR TITLE

GAS COOLING BOILER

\*\*\*310-129-0200 \*\*\* 110 \*\*\*  
CIRCULATION WATER PUMP

310-198-0100

EQUIPMENT TYPE

GAS DUCT

310-198-0200

EQUIPMENT TYPE

GAS DUCT

310-204-0100

EQUIPMENT TYPE

STACK

310-209-0100

EQUIPMENT TYPE

WATER LOCK

310-209-0200

EQUIPMENT TYPE

WATER LOCK

310-209-0300

EQUIPMENT TYPE

WATER LOCK

310-212-0100

EQUIPMENT TYPE

PROCESS GAS FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0100-M1 \*\*\* 160 \*\*\*  
PROCESS GAS FAN

OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 17  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-212-0200

EQUIPMENT TYPE

PROCESS GAS FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0200-M1 \*\*\* 160 \*\*\*  
PROCESS GAS FAN

310-212-0300

EQUIPMENT TYPE

COMBUSTION AIR FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0300-M1 \*\*\* 132 \*\*\*  
COMBUSTION AIR FAN

310-212-0400

EQUIPMENT TYPE

COMBUSTION AIR FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0400-M1 \*\*\* 132 \*\*\*  
COMBUSTION AIR FAN

310-212-0500

EQUIPMENT TYPE

FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0500-M1 \*\*\* 160 \*\*\*  
EXHAUST GAS FAN

310-212-0600

EQUIPMENT TYPE

FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0600-M1 \*\*\* 160 \*\*\*  
EXHAUST GAS FAN

310-212-0700

EQUIPMENT TYPE

COMBUSTION AIR FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-212-0700-M1 \*\*\* 75 \*\*\*  
COMBUSTION AIR FAN



OUTOKUMPU OY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 18  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
OUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-213-0800

EQUIPMENT TYPE

SECONDARY AIR FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-213-0800-M1 \*\*\* 90 \*\*\*  
SECONDARY AIR FAN

310-265-0100

EQUIPMENT TYPE

INCINERATOR

310-281-0100

EQUIPMENT TYPE

GAS REHEATER

310-370-0100

EQUIPMENT TYPE

FUEL OIL PLMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0100-M1 \*\*\* 3 \*\*\*  
FUEL OIL PLMP

310-370-0200

EQUIPMENT TYPE

FUEL OIL PLMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0200-M1 \*\*\* 3 \*\*\*  
FUEL OIL PLMP

310-370-0300

EQUIPMENT TYPE

FUEL OIL PLMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0300-M1 \*\*\* 3 \*\*\*  
FUEL OIL PLMP

310-374-0100

EQUIPMENT TYPE

SLURRY PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-374-0100-M1\*\*\* 90 \*\*\*  
SLURRY PUMP

BUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 19  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (8)  
BUTCKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

310-374-0200

EQUIPMENT TYPE

SLURRY PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-374-0200-M1 \*\*\* 90 \*\*\*  
SLURRY PUMP

310-374-0300

EQUIPMENT TYPE

SLURRY PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-374-0300-M1 \*\*\* 90 \*\*\*  
SLURRY PUMP

310-374-0400

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0400-M1 \*\*\* 30 \*\*\*  
WATER PUMP

310-374-0500

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0500-M1 \*\*\* 30 \*\*\*  
WATER PUMP

310-374-0600

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0600-M1 \*\*\* 30 \*\*\*  
WATER JMP

310-374-0700

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-370-0700-M1 \*\*\* 30 \*\*\*  
WATER PUMP

DUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 20  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
DUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

310-376-0100

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-376-0100-M1 \*\*\* 15 \*\*\*  
WATER PUMP

310-376-0200

EQUIPMENT TYPE

WATER PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-376-0200-M1 \*\*\* 15 \*\*\*  
WATER PUMP

310-420-0100

EQUIPMENT TYPE

DEMISTER

310-420-0200

EQUIPMENT TYPE

DEMISTER

310-423-0100

EQUIPMENT TYPE

SCRUBBER

310-423-0200

EQUIPMENT TYPE

ABSORPTION TOWER

310-431-0100

EQUIPMENT TYPE

AGGLOMERATOR

310-433-0100

EQUIPMENT TYPE

HCl CATALYZER

OUTKUMPU CV/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 21  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (8)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.65

310-433-0200

EQUIPMENT TYPE

COLD CATALYZER

310-433-0300

EQUIPMENT TYPE

COLD CATALYZER

310-464-0100

EQUIPMENT TYPE

SULPHUR CONDENSING TOWER

310-464-0200

EQUIPMENT TYPE

SULPHUR CONDENSING TOWER

310-516-0100

EQUIPMENT TYPE

MIXING TANK

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*310-516-0100-M1 \*\*\* 37 \*\*\*  
MIXING TANK

310-518-0100

EQUIPMENT TYPE

PUMP TANK

320-----0

EQUIPMENT TYPE

SULPHUR HANDLING AREA

320-117-0100

EQUIPMENT TYPE

BIN

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 22  
DEPARTMENT :PROJECT

CLIENT :PFCL  
DOCUMENT:MOTOR LIST (8)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-129-0100

EQUIPMENT TYPE

SULPHUR COOLING BOILER

320-129-0200

EQUIPMENT TYPE

SULPHUR COOLING BOILER

320-129-0300

EQUIPMENT TYPE

SULPHUR COOLING BOILER

320-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-167-0100-M1 \*\*\* 5,5 \*\*\*  
BELT CONVEYOR

320-167-0200

EQUIPMENT TYPE

BELT CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-167-0200-M1 \*\*\* 5,5 \*\*\*  
BELT CONVEYOR

320-167-0300

EQUIPMENT TYPE

BELT CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-167-0300-M1 \*\*\* 11 \*\*\*  
BELT CONVEYOR

320-172-0100

EQUIPMENT TYPE

SCREW CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-172-0100-M1 \*\*\* 0,75 \*\*\*  
SCREW CONVEYOR

CUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 23  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (8)  
CUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-212-0100

EQUIPMENT TYPE

AIR COOLING FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-212-0100-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

320-212-0200

EQUIPMENT TYPE

AIR COOLING FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 320-212-0200-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

320-212-0300

EQUIPMENT TYPE

AIR COOLING FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 320-212-0300-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

320-212-0400

EQUIPMENT TYPE

AIR COOLING FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 320-212-0400-M1\*\*\* 15 \*\*\*  
AIR COOLING FAN

320-214-0100

EQUIPMENT TYPE

AIR BLOWER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-214-0100-M1 \*\*\* 11 \*\*\*  
AIR BLOWER

320-244-0100

EQUIPMENT TYPE

GRAVITY FILTER

320-244-0200

EQUIPMENT TYPE

GRAVITY FILTER

BUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 24  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
BUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-0100

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0100-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

320-370-0200

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0200-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

320-370-0300

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0300-M1 \*\*\* 18,5 \*\*\*  
SULPHUR PUMP

320-370-0400

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0400-M1 \*\*\* 18,5 \*\*\*  
SULPHUR PUMP

320-370-0500

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0500-M1 \*\*\* 3 \*\*\*  
SULPHUR PUMP

320-370-0600

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-0600-M1 \*\*\* 3 \*\*\*  
S. HUR PUMP

BUTOKUMPU LY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 25  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
BUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-0700

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)

\*\*\*320-370-0700-M1 \*\*\* 15 \*\*\*

MOTOR TITLE

SULPHUR PUMP

320-370-0800

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)

\*\*\*320-370-0800-M1 \*\*\* 15 \*\*\*

MOTOR TITLE

SULPHUR PUMP

320-370-0900

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)

\*\*\*320-370-0900-M1 \*\*\* 11 \*\*\*

MOTOR TITLE

SULPHUR PUMP

320-370-1000

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)

\*\*\*320-370-1000-M1 \*\*\* 11 \*\*\*

MOTOR TITLE

SULPHUR PUMP

320-370-1100

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)

\*\*\*320-370-1100-M1 \*\*\* 15 \*\*\*

MOTOR TITLE

SULPHUR PUMP

320-370-1200

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)

\*\*\*320-370-1200-M1 \*\*\* 15 \*\*\*

MOTOR TITLE

SULPHUR PUMP



DUTCKUMPU BY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 26  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (8)  
DUTCKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-370-1300

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1300-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

320-370-1400

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1400-M1 \*\*\* 11 \*\*\*  
SULPHUR PUMP

320-370-1500

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1500-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

320-370-1600

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1600-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

320-370-1700

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1700-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

320-370-1800

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1800-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

OUTCUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 27  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
OUTCUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-370-1900

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-1900-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

320-370-2000

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-2000-M1 \*\*\* 90 \*\*\*  
SULPHUR CIRCULATING PUMP

320-370-2300

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-2300-M1 \*\*\* 37 \*\*\*  
SULPHUR PRILLING PUMP

320-370-2400

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-370-2400-M1 \*\*\* 37 \*\*\*  
SULPHUR PRILLING PUMP

320-371-0100

EQUIPMENT TYPE

DOCSAGE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-371-0100-M1 \*\*\* 1,5 \*\*\*  
DOCSAGE PUMP

320-371-0200

EQUIPMENT TYPE

DOCSAGE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-371-0200-M1 \*\*\* 1,5 \*\*\*  
DOCSAGE PUMP

DUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 28  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (R)  
DUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-371-0300

EQUIPMENT TYPE

DECSAGE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-371-0300-M1 \*\*\* 1,5 \*\*\*  
DECSAGE PUMP

320-411-0100

EQUIPMENT TYPE

VIBRATING SCREEN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-411-0100-M1 \*\*\* 15 \*\*\*  
VIBRATING SCREEN

320-411-0200

EQUIPMENT TYPE

VIBRATING SCREEN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-411-0200-M1 \*\*\* 15 \*\*\*  
VIBRATING SCREEN

320-509-0100

EQUIPMENT TYPE

PRILLING TOWER

320-511-0100

EQUIPMENT TYPE

AUTOCLAVE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-511-0100-M1 \*\*\* 3 \*\*\*  
AUTOCLAVE  
\*\*\*320-511-0100-M2 \*\*\* 3 \*\*\*  
AUTOCLAVE

320-511-0200

EQUIPMENT TYPE

AUTOCLAVE

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-511-0100-M1 \*\*\* 3 \*\*\*  
AUTOCLAVE  
\*\*\*320-511-0100-M2 \*\*\* 3 \*\*\*  
AUTOCLAVE

BUTKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 29  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
BUTKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

320-515-0100

EQUIPMENT TYPE

MEASURING TANK

320-516-0100

EQUIPMENT TYPE

MIXING TANK

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*320-516-0100-M1 \*\*\* 4 \*\*\*  
MIXING TANK

320-518-0100

EQUIPMENT TYPE

PUMP TANK

320-518-0200

EQUIPMENT TYPE

PUMP TANK

320-518-0300

EQUIPMENT TYPE

PUMP TANK

320-518-0400

EQUIPMENT TYPE

PUMP TANK

320-518-0500

EQUIPMENT TYPE

PUMP TANK

320-518-0600

EQUIPMENT TYPE

PUMP TANK

OUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 30  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

320-518-0700

EQUIPMENT TYPE

PUMP TANK

320-519-0100

EQUIPMENT TYPE

TANK

320-519-0200

EQUIPMENT TYPE

LAY TANK

330-----0

EQUIPMENT TYPE

WASTE LIQUID HANDLING AREA

330-212-0100

EQUIPMENT TYPE

FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-212-0100-M1 \*\*\* 5,5 \*\*\*  
EXHAUST GAS FAN

330-243-0100

EQUIPMENT TYPE

DRUM FILTER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-243-0100-M1 \*\*\* 1,1 \*\*\*  
DRUM FILTER  
\*\*\*330-243-0100-M2 \*\*\* 0,75 \*\*\*  
DRUM FILTER

330-370-0100

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-370-0100-M1 \*\*\* 2,2 \*\*\*  
UNDERFLOW PUMP

BUTOKUMPU DY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 31  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (8)  
BUTOKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

330-370-0200

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-370-0200-M1 \*\*\* 2.2 \*\*\*  
UNDERFLOW PUMP

330-370-0300

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-370-0300-M1 \*\*\* 2.2 \*\*\*  
OVERFLOW PUMP

330-370-0400

EQUIPMENT TYPE

PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-370-0400-M1 \*\*\* 2.2 \*\*\*  
OVERFLOW PUMP

330-375-0100

EQUIPMENT TYPE

VACUUM PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-375-0100-M1 \*\*\* 11 \*\*\*  
VACUUM PUMP

330-510-0100

EQUIPMENT TYPE

TANK

330-510-0200

EQUIPMENT TYPE

TANK

330-518-0100

EQUIPMENT TYPE

PUMP TANK

OUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 32  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
OUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

330-518-0200

EQUIPMENT TYPE

PUMP TANK

330-521-0100

EQUIPMENT TYPE

REACTOR TANK

330-532-0100

EQUIPMENT TYPE

THICKENER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*330-532-0100-M1 \*\*\* 2 \*\*\*  
THICKENER  
\*\*\*330-532-0100-M2 \*\*\* 0,75 \*\*\*  
THICKENER

500-----0

EQUIPMENT TYPE

COAL PLANT AREA

500-118-0100

EQUIPMENT TYPE

STORAGE BIN

500-118-0200

EQUIPMENT TYPE

STORAGE BIN

500-118-0300

EQUIPMENT TYPE

STORAGE BIN

500-118-0400

EQUIPMENT TYPE

STORAGE BIN

CUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 33  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
CUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

500-133-0100

EQUIPMENT TYPE

OIL BURNER

500-167-0100

EQUIPMENT TYPE

BELT CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-167-0100-M1 \*\*\* 45 \*\*\*  
BELT CONVEYOR

500-167-0200

EQUIPMENT TYPE

BELT CONVEYOR

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-167-0200-M1 \*\*\* 7.5 \*\*\*  
BELT CONVEYOR

500-170-0100

EQUIPMENT TYPE

PNEUMATIC CONVEYOR SYSTEM

500-170-0200

EQUIPMENT TYPE

PNEUMATIC CONVEYOR SYSTEM

500-179-0100

EQUIPMENT TYPE

COAL INJECTION SYSTEM

500-202-0100

EQUIPMENT TYPE

FEED HOPPER



BUTKUMPU CY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 34  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
BUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

500-212-0100

EQUIPMENT TYPE

FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 500-212-0100-M1\*\*\* 30 \*\*\*  
FAN

500-212-0200

EQUIPMENT TYPE

FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\* 500-212-0200-M1\*\*\* 250 \*\*\*  
FAN

500-212-0300

EQUIPMENT TYPE

EXHAUST AIR FAN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-212-030-M1 \*\*\*- 22 \*\*\*  
FAN

500-212-0400

EQUIPMENT TYPE

FAN

MOTOR NO./RATING (KW)

\*\*\*500-212-0400-M1 \*\*\* 11 \*\*\*

500-216-0100

EQUIPMENT TYPE

AIR LOCK FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-216-0100-M1 \*\*\* 2.2 \*\*\*  
AIR LOCK FEEDER

500-216-0200

EQUIPMENT TYPE

AIR LOCK FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-216-0200-M1 \*\*\* 2.2 \*\*\*  
AIR LOCK FEEDER

GUTCKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 35  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (B)  
GUTCKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-218-0100

EQUIPMENT TYPE

BELT FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-218-0100-M1 \*\*\* 7.5 \*\*\*  
BELT FEEDER

500-223-0100

EQUIPMENT TYPE

DRAG FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-223-0100-M1 \*\*\* 7.5 \*\*\*  
DRAG FEEDER

500-223-0200

EQUIPMENT TYPE

DRAG FEEDER

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-223-0200-M1 \*\*\* 7.5 \*\*\*  
DRAG FEEDER

500-281-0100

EQUIPMENT TYPE

PREHEATER

500-325-0100

EQUIPMENT TYPE

MILL

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-325-0100-M1 \*\*\* 315 \*\*\*  
MILL

500-325-0200

EQUIPMENT TYPE

MILL

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-325-0200-M1 \*\*\* 315 \*\*\*  
MILL

DUTOKUMPU CY/ENGINEERING DIVISION  
PROJECT :PPCL PYRITE SMELTER

DATE :85-08-28 PAGE NO: 36  
DEPARTMENT :PROJECT

CLIENT :PPCL  
DOCUMENT:MOTOR LIST (8)  
DUTOKUMPU NO :360 100 900 001 ALTI  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

500-411-0100

EQUIPMENT TYPE

VIBRATING SCREEN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-411-0100-M1 \*\*\* 2.2 \*\*\*  
VIBRATING SCREEN

500-411-0200

EQUIPMENT TYPE

VIBRATING SCREEN

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*500-411-0200-M1 \*\*\* 2.2 \*\*\*  
VIBRATING SCREEN

500-417-0100

EQUIPMENT TYPE

BAG FILTER

500-419-0100

EQUIPMENT TYPE

CYCLONE

600-----0

EQUIPMENT TYPE

POWER PLANT AREA

600-122-0100

EQUIPMENT TYPE

AUXILIARY BOILER

600-123-0100

EQUIPMENT TYPE

SUPERHEATING BOILER

600-276-0100

EQUIPMENT TYPE

CONDENSER

OUTKUMPU BY/ENGINEERING DIVISION  
PROJECT : PPCL PYRITE SMELTER

DATE : 85-08-28 PAGE NO: 37  
DEPARTMENT : PROJECT

CLIENT : PPCL  
DOCUMENT: MOTOR LIST (B)  
OUTKUMPU NO : 360 100 900 001 ALTI  
DESIGN : AKI

CLIENT NO :  
REVISION : 5 DATE : 22.08.85

600-280-0100

EQUIPMENT TYPE

HEAT EXCHANGER

600-280-0200

EQUIPMENT TYPE

HEAT EXCHANGER

600-376-0100

EQUIPMENT TYPE

CONDENSATE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0100-M1 \*\*\* 22 \*\*\*  
CONDENSATE PUMP

600-376-0200

EQUIPMENT TYPE

CONDENSATE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0200-M1 \*\*\* 22 \*\*\*  
CONDENSATE PUMP

600-376-0300

EQUIPMENT TYPE

CONDENSATE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0300-M1 \*\*\* 400 \*\*\*  
CONDENSATE PUMP

600-376-0400

EQUIPMENT TYPE

CONDENSATE PUMP

600-376-0500

EQUIPMENT TYPE

CONDENSATE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0500-M1 \*\*\* 30 \*\*\*  
FEED WATER PUMP

CLIENT :PPCL  
DOCUMENT: MOTOR LIST (B)  
JUTOKUMPU NO :360 100 900 001 ALT1  
DESIGN :AKI

CLIENT NO :  
REVISION :5 DATE :22.08.85

600-376-0600

EQUIPMENT TYPE

CONDENSATE PUMP

600-376-0700

EQUIPMENT TYPE

CONDENSATE PUMP

MOTOR NO./RATING (KW)  
MOTOR TITLE

\*\*\*600-376-0700-M1 \*\*\* 15 \*\*\*  
FEED WATER PUMP

600-514-0100

EQUIPMENT TYPE

FEED TANK

600-556-0100

EQUIPMENT TYPE

TURBOALTERNATOR

700-----0

EQUIPMENT TYPE

OXYGEN PLANT AREA

800-----0

EQUIPMENT TYPE

LIME STONE SLURRY PREPARATION

900-----0

EQUIPMENT TYPE

WATER TREATMENT AREA

950-----0

EQUIPMENT TYPE

COMPRESSED AIR STATION