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OUTOKUMPU OY
ENGINEERING DIVISION

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29 November 1983

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PYRITES PHOSPHATES AND CHEMICALS LTD
INDIA

INVESTIGATIONS TO PRODUCE SULPHUR AND SULPHURIC ACID FROM AMJHORE PYRITE DEPOSIT

STUDY PHASE 1
COMPARISON OF PROCESS ALTERNATIVES

FINAL REPORT WITH AN ADDITIONAL PROCESS ALTERNATIVE

1 SUMMARY

1 SUMMARY

1.1 Introduction

The study work reported in this document is the first phase of the work described in the UNIDO Contract No. 82/91/SM. Additional information has been included in this report as agreed in a meeting between PPCL, UNIDO and Outokumpu on 28 October 1983 in Espoo, Finland. The additional information has been done free of cost and includes the data for Alternative 3 and Answers and Comments on the Questions made by PPCL Engineers.

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

The purpose of the Phase 1 of the study is to select the technically and economically viable processing route for Amjhore pyrites from two preselected process alternatives. A rough estimate of investment cost of process facilities for both alternatives is also presented. An additional Alternative 3 has been calculated on the same basis as the two main alternatives.

The basic data and information for the study was collected by two Outokumpu engineers during their visit to the plant site and PPCL offices in India from 22 to 30 January 1983. A representative sample of Amjhore pyrites was received from PPCL and carried to Finland. Analyzing of the samples and grinding and flotation tests were made in February 1983 at Outokumpu's Metallurgical Research Centre in Finland. The test report has been delivered to PPCL on 25 May 1983.

Originally the plant capacity was agreed to be 1,500 tons per day of pyrite feed, but it was changed by PPCL to 2,000 tons per day by telex message No. 171 dated 17 February 1983. The change was accepted and taken into account by Outokumpu, although it caused some extra work and deteriorated the time schedule.

PPCL confirmed the pyrite transfer price as Rs 350 per ton which according to Outokumpu's own mining experience is rather high. This price has a major effect on the profitability of the plant and it should be checked in detail during the Phase 2 of the study. The accuracy of the price has no effect on the process selection because it has been kept constant in all Alternatives.

According to the Agreement the Alternative 1 is a process where pyrite is smelted into matte and slag in a flash smelting furnace and elemental sulphur is produced from flash furnace gas. The matte is further treated in a roaster into iron calcine and sulphur dioxide gas to be used for sulphuric acid production. This alternative was one of the four proposed in Outokumpu's offer at the time when the basic data for the study as not yet known. During the field trip in India it was clearly stated that iron calcine does not have any commercial value and that the sulphuric acid production is not desirable. Therefore it turned out that the economically optimum way to treat the pyrite is to oxidize it totally into slag and gas in the flash smelting furnace, thus also avoiding the production of sulphuric acid. This method also simplifies the process by eliminating the roaster.

1.2 Process alternatives

The ground pyrite ore is dried and then fed to the flash smelting furnace. The gases are reduced with coal, cooled, cleaned and catalyzed to convert all sulphur compounds into elemental sulphur, which is condensed. Separated dusts are recirculated and high pressure steam is used for power generation.

In the first process alternative only slag is produced as molten product from the flash furnace, when a roaster is not necessary.

In the second process alternative both iron sulphide matte and slag are produced as molten products from the flash furnace. The matte is roasted and roaster gases are led into the flash smelting furnace in order to achieve higher elemental sulphur production.

In the additional alternative (Alternative 3) pyrite is smelted into iron sulphide matte and slag in flash smelting furnace. Further treatment of matte has not been considered in this study.

In all cases a fairly high oxidation degree for pyrite is required because the high silica content in slag has to be diluted with oxidized iron in order to ensure the fluidity of the slag.

1.3 Economic evaluation

1.3.1 Capital cost

The fixed capital of the alternatives is estimated including overall cost of process facilities, but excluding service facilities, infrastructure and working capital.

The estimate includes excise and custom duties as well as sales tax.

Fixed capital (Rs 1000):

	Alternative 1	Alternative 2	Alternative 3
Indian supplies	1,164,000	1,228,320	1,101,000
Foreign supplies	510,600	519,000	495,100
TOTAL	1,674,600	1,747,320	1,596,000

1.3.2 Operating cost, Rs 1000/annum

	Alternative 1	Alternative 2	Alternative 3
Variable operating cost			
- pyrite	218,750	218,750	218,750
- utilities and supplies	127,865	123,482	109,685
Fixed operating costs	64,682	67,126	63,682
TOTAL	411,297	409,358	392,117

1.3.3 Annual revenues, Rs 1000/annum

	Alternative 1	Alternative 2	Alternative 3
Elemental sulphur (Rs/t 1350)	292,950	295,650	263,250
TOTAL	292,950	295,650	263,250

1.3.4
Comparison of annual profits, Rs100/annum

	Alternative 1	Alternative 2	Alternative 3
Revenues	292,950	295,650	263,250
./. variable operating costs	346,615	342,232	328,435
./. fixed operating costs	64,682	67,126	63,682
	-118,347	-113,708	-128,867
./. annuity of investment (12 %, 15 years)	245,830	256,500	234,300
NET PROFIT	-364,177	-370,208	-363,167

1.4
Conclusions and recommendations

The technical evaluation of processes is based on comparable technical solutions. E.g. if double equipment has been recommended they have been used in all alternatives and the same principles have been used for dimensioning the corresponding equipment. The same price basis has also been used for equipment and utilities.

In this way a reliable comparison of process alternatives can be achieved and the differences will show up even if the actual cost estimates are not accurate enough for a final decision whether to construct the plant or not. The order of magnitude of investment cost of production facilities can also be achieved.

The well grounded and accurate estimate, i.e. the Study Phase II, has to be made for the optimum process alternative before making the final decision on the construction project.

This comparison of the alternatives gives fairly small economic differences between the processes making the selection difficult. All the bottom line figures can be as well considered equal within the limits of accuracy in calculations.

The Alternative 2 has a slightly smaller cost of operation compared to Alternative 1 due to lower coal and oil consumption in gas reduction and sulphur plant. The consumptions are lower due to smaller gas flow, which again mainly results from the circulation of flue dust into the roaster instead of flash smelting furnace, thus allowing the use of higher oxygen enrichment in flash smelting furance.

The cost of investment in Alternative 1 is lower than in Alternative 2 due to the absence of roasting process.

The bottom line shows that Alternative 1 is slightly more economic than Alternative 2 and it is also much simplier and a more flexible process to operate because the roasting step has been avoided. If required, it also allows feeding much more shales than calculated here, which makes the process more profitable by increasing the sulphur production and relatively decreasing the gas flow by increased oxygen enrichment. For these reasons Outokumpu finds Alternative 1 better than Alternative 2.

The Alternative 3 has the highest cost of operation per ton of produced sulphur but lowest cost of investment. The bottom line is about equal to the ALternative 1. The further recovery of sulphur from the matte will require additional cost of investment and operation and therefore the Alternative 3 is not comparable to the other alternatives in this study if the target is to recover all of the sulphur from the pyrite.

The matte treatment process, especially the Sherrit-Gordon pressure leaching has considerable and probably positive influence also on the economy of the smelter, because some residues are circulating back into the flash smelting furnace and because it might be possible to feed flash smelter flue dust into the matte treatment process thus reducing the gas flow in sulphur plant by increasing the oxygen enrichment. Optimizing this process combination and its economic evaluation is a completely new alternative outside the scope of this study and will require a close co-operation between Outokumpu and the owner of the matte treatment process.

There are several cost items which should be thoroughly checked and discussed with PPCL during the Study Phase II in order to make the plant more profitable. Such items are the price of cooling water and the maintenance cost in Indian conditions which in this evaluation are almost half of the operation cost if the price of pyrite is not taken into account. Reduction in cost of investment can also be made by closer dimensioning and replacing the double equipment by one bigger unit, but it will have certain effect on the on-line availability of the plant and flexibility of operation which effects have to be discussed during the Study Phase II. Anyhow the above mentioned possible cost reductions have the same influence on all the process alternatives, thus having no influence on the process selection.

1.5 Answers and comments on the questions made by PPCL engineers

The review of the Phase I Draft Report was made in a meeting between PPCL and Outokumpu representatives from 12 to 16 September 1983 held in the premises of Outokumpu Engineering Division, Espoo, Finland.

Several questions were raised and comments were made by PPCL engineers. These were answered by Outokumpu on the basis of the design work made in the Phase I and it was noticed that most of the items of interest do not have any influence on the process selection, but they are very important items to be discussed when optimizing the selected process alternative in the Phase II of the study.

General comments on the main questions are made here as agreed in the meeting between UNIDO, PPCL and Outokumpu on 28 October 1983.

1.5.1 Dryer

The moisture of flash smelting furnace feed has to be less than 0.5 percent in order to ensure rapid reactions in the furnace and prevent the agglomeration in transportation and feeding system.

1.5.2 Auxiliary boiler

The combined coal fired superheating-auxiliary boiler proposed in the Draft Report has been replaced in this Final Report by a separate coal fired superheating boiler and an oil fired small auxiliary boiler thus avoiding unnecessary electric power production and lowering the cost of investment and operation.

1.5.3
Arsenic removal

The necessity of arsenic removal depends on regulations and standards for sulphur in India. Considerable cost savings can be made if the equipment can be deleted as unnecessary.

1.5.4
Gas reheater

The direct gas reheating before the hot catalyzer has been the usual Outokumpu practice and there is no experience in an indirect heating in this case. An indirect heater for such a big gas flow is probably fairly expensive which would reduce the savings gained in the gas line due to lower gas flow.

1.5.5
Slag removal

There are several possibilities to discharge the flash smelting furnace slag. In this Study Phase I the granulation has been selected because it is easy to operate and makes the slag in a form which is convenient from the transportation point of view. In the Phase II other possibilities like cooling on the ground will be studied on the basis of the local requirements for the slag disposal and possible utilization of the waste slag.

1.5.6
Parallel equipment

Most of the parallel equipment presented in this Phase I report can be replaced by one bigger unit thus saving cost of investment. Relying on one unit instead of two has an effect on the on-line availability of the plant and the optimization between the cost and availability is included in the scope of the Study Phase II. The set up presented in this report is the common and proven practice of Outokumpu.

1.5.7
Liquid sulphur cooling boiler

The sulphur cooling system presented in this report is the only one which Outokumpu is experienced in. The detailed size and arrangement of the equipment will be determined during the Phase II of this study.

1.5.8
Grain size of the feed to the flash smelting furnace

The grain size of the pyrite stated in this report is similar to the concentrate in Outokumpu's pyrite smelter. Generally is can be stated that the feed material must have the fineness of flotation concentrate. Some copper smelters are successfully feeding with their concentrates also varying amounts of fine crushed reverts. The grain size of the feed will be thoroughly considered in the Phase II of the study if it will turn out that moderate changes in requirement would cause considerable savings in the feed preparation.

1.5.9
Stack emission of sulphur compounds

The control of stack emissions will be specified in the Phase II of the study after receiving the detailed requirements under Indian conditions.

1.5.10
Sulphur prilling

The prilling method specified in this study phase I has been used at Outokumpu's own sulphur smelter and is a proven and reliable system. The prilled sulphur has also been considered as the best form of product. Casting methods will be considered in the Phase II if the casted product has an acceptable form.

1.5.11
Indian/foreign supplies

The comments made on splitting the Indian and foreign supplies of equipment and taxational notes have been taken into account in this Final Report of Phase I.

2
BASIC DATA

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

ATTACHMENT

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

1.	LOCATION OF THE INDUSTRIAL AREA	: AMJHORE, DISTT. ROHTAS, BIHAR, INDIA
1.1	General Plant Area (map/air photograph)	: Map attached
	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, scale approx. 1:2000)	: Map attached
	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/...

2.2 Steam

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

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.

Layout of existing system
Connection points
Air pressure
Amount available

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

....3/...

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
Capacities : Main open natural drainage channel is connected to Sona 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 syncronous 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.

.....4/...

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 / Design : 200 kN/m^2 (safe bearing capacity at 2 mtrs. 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 scale : Not applicable

4. ATMOSPHERIC DATA

4.1 Monthly air temp.

Average : 35°C

Max. : 48°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. :

.. 6/...

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-Sone.
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 wagondload 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	:	450,000 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 Mineralogical analysis Moisture Grain size, screen analysis	:	Given separately in the enclosed sheet.

....7/...

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 FuelOil - 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		$CaCO_3$ - 80% SiO_2 - 7% R_2O_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		

....8/...

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 ± %

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./Te. of 100% acid produced

Sulphur trioxide : 0.5 Kg./Te " "

Carbon monoxide) Hydrogen sulphide) : Follow EPA Standards

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) : ₦.23,000/ per each

....9/...

- concrete mass, ready installed including boarding and steel reinforcements. ... Kr. 2,250/m^3
- supporting steel constructions ready installed, painted ... Kr. 8,000/Te.
- walls and roofings of industrial buildings ... Kr. 100/m^2
- offices, change rooms ... Kr. 1,200/m^2
- earth excavation ... Kr. 15/m^3
- earth filling ... Kr. 15/m^3
- rock blasting ... Kr. 30/m^3
- asphalt covers ... Kr. 100/m^2

7.2 Equipment and materials ... Materials and manuf. | Transport and erect.

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

....10/...

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

Constructions(ready installed)

	Materials and manuf. Rs.	Transp. and erec. Rs.
- Service platforms, stairs etc.of mild steel ...	15/kg	2/kg
- Tanks, bins etc. of mild steel. ...	20/kg	2/kg
- Tanks of acid proof steel ...	180/kg	
- Tanks of reinforced plastics..	80/kg	2/kg
- Gas ducts of mild steel ...	20/kg	2/kg

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

- Pumps
  - type - horizontal,centrifugal.
  - capacity 25 m^3/hr.
  - pressure 50 MLC ... Rs.18,310.00 10%
  - material SS 316
  - elect ic power 10 HP drive
- Belt conveyors
  - type-horizontal, troughed, three roll ground conveyor
  - 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^3/hr. ... Rs.107,000.00 10%

....11/...

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

....12/...

- ball charge - 5.5 Te.

- Drum filters
  - filter area - 67.2 M^2
  - 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
  - Voltage
- Cables (3 core)
  - cross section area 120 mm^2 Rs. 78/m -
  - insulation PVC (steelwire armoured)
- Cable racks Rs.10/kg
- Instrumentation Cable Trays Material-Al./Anodized Al Rs.125/m.

7.4 Piping: cost of materials and erection, sizes specified

	Rs.
- welded steel pipes	15/kg
- seamless steel pipes	18/kg
- Acid proof steel pipes	100/kg
- Copper pipes	60/kg
- Plastic pipes	25-300/kg
- Lead pipes	25/kg
- High pressure pipes	20/kg
- Curves	20/kg
- Collars and flanges (Carbon-steel)	25/kg
- T-pieces	20/kg

- Valves
  - Carbon steel, 15-250 NB
  - Gate (Rs. 700-5000)
  - Globe(Rs.400-5000)

....13/...

- Pipe bridges and fittings 12/kg

7.5 Erection and installation work

- Wages with social cost
  - skilled labour 1000/month
  - helpers 500/month

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

- local suppliers 8% excise duty; 4% S.T.
- foreign supplies 40% customs duty of CIF prices
- Engg.commissioning etc. 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
Fresh (potable) water	1	M^3
Cooling water	0.50	M^3
Coal	200.00	Te
Fuel oil	2400.00	Te
Natural gas	-	-
Electricity	0.65	kwh
Propane (LPG)	3.25	kg.
Sulphuric Acid	900.00	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	

....14/...

8.2 Wages and salaries including social costs:

	Rs.
Managers	2,500/-
Operating Engineers / Foreman	2,000/-
Skilled labour	1,500/-
Unskilled labour	1,000/-

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 / Harbour stowing costs / Harbour duties	Works out to about 2 to 3% of F.O.B. cost of equipment.

9. DATA FOR ESTIMATION OF REVENUES

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

Iron calcine	No value
- Fe	appr. 65%
- S	" 0.5%
- Cu	" 0.05%
- SiO2	" 5%

Elemental sulphur(liquid)

Elemental sulphur (solid) Rs.1,350/- for fertilizer use and Rs.1,500/- for non-fertilizer use.

So_2-bearing process gases for manufacturing of sulphuric acid

So2-content appr. 7-9 vol.%
o2-content appr. 6-7 vol.%

....15/...

10. DATA FOR PROFITABILITY CALCULATIONS

10.1 Tax legislation

Depreciations	- 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	- excise 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	- three years
interest	- 11.5% for long term loan and 10% for short term loan.
Pay back period	- 10 years.

10.4 Monetary units tobe used and rate of exchange

Indian Rupees	- 1 US $ = Rs. 9.5

*****

TYPICAL ANALYSIS OF PYRITES

	Percent
Sulphide Sulphur(S)	... 38.04
Sulphate Sulphur(S)	... 1.41
Silica (SiO2)	... 15.28
Total Iron(Fe)	... 35.72
Alumina (Al2O3)	... 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

$S_{sulphide}$	38.04 %
$S_{sulphate}$	1.41 %
Fe	35.72 %
As	0.005 %
C	1.0 %
SiO_2	15.28 %
Al_2O_3	2.09 %
Grain size	80 % - 74 um
Moisture (wet basis)	8 %

2.2.2 Top shale

$S_{sulphide}$	9.2 %
$S_{sulphate}$	1.6 %
Fe	11.2 %
C	2.6 %
SiO_2	50.4 %
Al_2O_3	13.2 %
Grain size	80 % - 74 um
Moisture (wet basis)	8 %

2.2.3 Coal

C_{tot}	62.5 %
C_{fix}	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_2	40 %
CaO^2	10 %
Al_2O_3	20 %
Fe_2O_3	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

$Ca(OH)_2$	90 %
Balance	10 %

2.2.6
Sulphuric acid

H_2SO_4	94 %

2.2.7
Catalyst mass

Al_2O_3	34 %
CaO	21 %
Fe	7 %
SiO_2	3 %

3
PROCESS DESIGN

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 µm and moisture 8 %.

From the concentrate day bins the pyrite ore and other feed materials 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 a bag filter. The dried material is pneumatically conveyed to the dried charge bin.

3.1.1.2
Flash Smelting, Alternative 1

In this alternative the feed material mixture consists of pyrite ore, top shale and recycled flue dust. 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 led through the roof of the reaction shaft by means of a concentrate burner. Inside the reaction shaft the well distributed pyrite, top shale and flue dust 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 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
Flash smelting, Alternative 2

In this alternative the feed mixture consists only of pyrite ore. The process air and oxygen are preheated to 200°C. The hot roaster gases are mixed with the oxygen enriched air. With oxygen enrichment the temperature of the furnace is controlled and with the total oxygen amount the matte grade is controlled.

Inside the reaction shaft the well distributed pyrite particles, air, oxygen and roaster gases react with calcine dust particles. The retention time for the suspension 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 iron matte, slag and gas are produced.

In the horizontal settler part the molten iron matte and slag are separated from the gas. The matte and slag are tapped separately and granulated with water. The granulated slag is transported by a belt conveyor to a temporary slag storage area and the granulated matte to the roasting plant.

The sulphur content of the matte is about 22-23 % and sulphur dioxide of the smelting gas about 23 %.

3.1.1.4
Flash smelting, Alternative 3

In this alternative the feed consists of pyrite ore and recycled flue dust. The process air and oxygen are preheated to 200°C with saturated 70 bar steam. With oxygen enrichment the temperature of the furnace is controlled, and the matte grade is controlled with the total oxygen amount.

Inside the reaction shaft the well distributed pyrite particles and flue dust particles react with oxygen. As a result of the reactions iron matte, slag and gas are produced.

In the horizontal settler part of the furnace the molten iron matte and slag are separated from the gas. The matte and slag are tapped separately and granulated with water.

The sulphur content of the matte is about 22-23 % and sulphur dioxide of the smelting gas about 21 %.

3.1.1.5
Reduction and process gas handling

After the reaction shaft the gas contains SO_2 and therefore a 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.

$$C + CO_2 \longrightarrow 2CO$$

$$SO_2 + 2CO \rightarrow 0.5\ S_2 + 2CO_2$$

$$SO_2 + 2H_2 \rightarrow 0.5\ S_2 + 2H_2O$$

$$S_2 + 2H_2 \rightarrow 2\ H_2S$$

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 µm) against the gas flow.

The maximum sulphur production is obtained when the gas after reduction contains a little less SO_2 than half of the sum ($H_2S + H_2 + CO + COS$).

The reduction is endothermic resulting in a temperature decrease. The temperature after the reduction is 1230 °C.

The reduced process gas together with molten dust is fed into the waste heat boiler, where cooling and solidyfying of dust compounds take place. The boiler consists of a radiation chamber and a convection section. The gas is cooled to 350°C 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 360°C.

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

In alternative 2 the underflow of the thickener is pumped onto the matte in the scrape conveyors of the granulation pit.

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

$$2\ CO + SO_2 \longrightarrow 2\ CO_2 + 1/n\ S_n$$

$$2\ CO + S_2 \longrightarrow 2\ COS$$

$$2\ H_2 + SO_2 \longrightarrow 2H_2O + 1/n\ S_n$$

$$2\ H_2 + S_2 \longrightarrow 2\ H_2S$$

Also sulphur vapour S_2 polymerizes to S_4, S_6 and 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°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 435°C in a gas reheater by burning fuel oil with air.

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

$$2\ CO + SO_2 \rightarrow 1/n\ S_n + 2\ CO_2$$

$$COS + H_2O \rightarrow H_2S + CO_2$$

These reactions are exothermic and thus the process gas temperature increases to 480°C. A high alumina cement with Al_2O_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°C before cold catalyzers.

The main reaction of the cold catalyzers is:

$$SO_2 + 2\ H_2S \rightarrow 3/n\ S_n + 2\ H_2O$$

The reaction is slightly exothermic and results in a temperature rise 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 a 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, and after that the gas is scrubbed with water. In the gas scrubber the gas cools to 50°C, and after the scrubber the gas is led to a stack.

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°C. 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 the sulphur spray to cool sulphur drops and delay their falling.

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

3.1.3
Matte roasting area, Alternative 2

The iron sulphide-oxide matte produced by the flash smelting method is granulated with water, dewatered together with the flue dust on a screen bottom scraper conveyor to 10 % H_2O and then transported with belt conveyors to a stockpile.

The matte and dust are kept in a stockpile for about two weeks, in which time the moisture content is reduced to about 3-4 %. Then the feed material is transported into two charge bins.

From the charge bins matte and dust are fed into the roasting furnace. Oxidation is carried out at about 1050°C with 10-20 % excess of air.

The following reactions take place in the oxidizing roaster:

(1) $FeS + 1.75\ O_2 \rightarrow 0.5\ Fe_2O_3 + SO_2$

(2) $Fe_3O_4 + 0.25\ O_2 \rightarrow 1.5\ Fe_2O_3$

(3) $FeO + 0.25\ O_2 \rightarrow 0.5\ Fe_2O_3$

(4) $C + O_2 \rightarrow CO_2$

Roasting is performed using a high fluidizing velocity, 2.5...3 m/s, the pressure drop of the bed being about 15-18 kPa and that of the grate 3 kPa.

In spite of the high fluizing velocity the coarse part of calcine (60-70 %) can be removed as "underflow" from the bed. The fine part of the calcine is removed from the gas in cyclones. The calcines are cooled in a wet cooler and then transported by belt conveyors to a stockpile.

All the reactions mentioned (1...4) are exothermic and thus the excess heat must be removed. In order to keep the heat flows in balance the reactor is equipped with cooling elements installed horizontally in the fluidizing bed above the grate. In these cooling elements saturated steam is produced at 70 bar.

The process gas of the roasting furnace is led through the cyclones to the reaction shaft of the flash smelting furnace. The sulphur dioxide content of the gas is about 7-8 %.

3.1.4
Power plant area

3.1.4.1
Steam system

Waste heat from flash smelting furnace is recovered by a waste heat boiler which produces saturated high pressure steam of 70 bar as well as in the process alternative 2 roasting furnace cooling elements. Part of this steam is reduced to 20 bar and used in the steam dryers.

Main part of the high pressure steam is superheated up to 500°C in a separate, coal fired superheater. The superheated steam is then used for generation of electric power in a turboalternator.

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

The turbine of the turboalternator is of extraction bleed condensing type with high and low pressure stages. The turbine has one intermediate bleeding of 20 bar for feed water preheater. The steam of 5.5 bar after high pressure stage can be bled to the low pressure network when low pressure steam from process is not available. Normally this steam and part of steam from low pressure network flows through the low pressure section of the turbine to a vacuum 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 (deaerator) and in sulphur handling, but the excess as mentioned in turbine low pressure section.

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

The power consumption of the whole area will be in range of 10...14 MW depending of the alternative.The rated power of the turboalternator will be appr 17.5 MW.

The power generation/consumption of the plant will be kept in balance and the excess saturated waste heat steam will be condensed in the auxiliary dump condenser.

3.1.4.2
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. The firing coal dust of superheater boiler is fed directly to coal dust burners through a gravimetric coal dust proportioning system.

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 succesfully with a peak moisture content at up to 25 % and capacity to meet plant requirements.

3.1.4.3
Water treatment plant

The water treatment plant is designed to produce semi-soft and demineralized water of raw ground water. The water treatment plant is dimensioned to meet the demand of semi-soft water. Semi-soft water is prepared by cation exchange with a design flow of about 50 m^3/h. Demineralized water is prepared by filtration, reverse osmosis and cation and anion exchange. The design flow is about 30 m^3/h.

3.1.5
Oxygen plant area

The air separation plant produces oxygen to enrich the flash smelting furnace process and combustion air and to 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 simultaneuos elimination of the carbon and sulphur dioxides is performed by means of molecular sieves.

The purity of produced oxygen is 95 %.

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 %.

3.2.1
Flash Smelting Area

		ALT.	1	2	3
Steam Dryer					
Pyrite ore (dry)	t/h		83.5	83.5	83.5
- moisture (wet basis)	%		8.0	8.0	8.0
Top shale (dry)	t/h		6.0	-	-
- moisture (wet basis)	%		8.0	-	-
FSF flue dust (dry)	t/h		10.0	-	8.6
- moisture (wet basis)	%		8.0	-	8.0
Steam 20 bar, 300°C	t/h		18	15	16
Dryer exhaust gas	m^3/h		24200	20300	22300
- temperature	°C		100	100	100
Steam Heated Air Preheater					
Process air	m^3/h		-	19700	72100
Process oxygen	m^3/h		-	15100	9370
- temperature after preheating	°C		-	200	200
Steam 70 bar, satur.	t/h		-	5.8	13.4
Flash Smelting Furnace					
Pyrite	t/h		83.5	83.5	83.5
Top Shale	t/h		6.0	-	-
Flue dust	t/h		10.0	-	8.6
Air to reaction shaft	m^3/h		95300	19700	72100
Oxygen to reaction shaft	m^3/h		11500	15100	9370
- temperature	°C		40	200	200
- oxygen enrichment	%		29.2	53	29.7
Process gas from Roaster	m^3/h		-	50800	-
Calcine dust	t/h		-	2.5	-
- temperature	°C		-	1000	-

		ALT.	1	2	3
Matte		t/h	-	22.6	17.2
Slag		t/h	64.5	33.2	43.0
Gas after smelting		m^3/h	105000	86300	81900
- temperature		°C	1390	1360	1360
- analysis	H_2	%	0.2	0.3	0.3
	H_2S	%	0.0	0.1	0.1
	CO	%	0.4	0.6	0.6
	SO_2	%	21.1	23.2	21.5
	S_2	%	0.3	1.5	1.4
	H_2O	%	5.0	6.1	4.8
	CO_2	%	3.4	3.5	3.4
	N_2	%	69.6	64.7	68.0
Coal to settler		t_3/h	2.95	3.25	2.85
Combustion air		m^3/h	12700	14000	12300
Oxygen		m^3/h	1670	1850	1620
- temperature		°C	40	40	40
- oxygen enrichment		%	30	30	30
Coal for reduction		t/h	18.0	16.4	14.3
Injection air		m^3/h	2200	2000	1700
Flue dust		t/h	10.0	9.2	8.6
Gas after furnace		m^3/h	139500	120600	111900
- temperature		°C	1230	1230	1230
- analysis	H_2	%	1.1	1.2	1.1
	H_2S	%	1.0	1.1	1.0
	CO	%	4.9	5.3	5.1
	COS	%	0.2	0.2	0.2
	SO_2	%	3.2	3.4	3.2
	S_2	%	6.0	7.0	6.7
	H_2O	%	8.8	9.8	8.7
	CO_2	%	14.3	15.5	14.6
	N_2	%	60.5	56.5	59.4
Waste heat boiler					
Flue dust from boiler		t/h	2.0	1.8	1.7
Steam production		t/h	139	126	114
- pressure		bar	70	70	70
- feed water temperature		°C	200	200	200
Gas after boiler		m^3/h	133600	114400	106600
- temperature		°C	350	350	350
- analysis	H_2	%	0.15	0.15	0.2
	H_2S	%	1.5	1.7	1.5
	CO	%	2.1	2.1	2.1
	COS	%	1.1	1.15	1.1

		ALT	1	2	3
	SO_2	%	2.2	2.2	2.1
	$S_2 \ldots S_8$	%	2.25	2.6	2.5
	H_2O	%	9.7	11.0	9.8
	CO_2	%	17.1	18.85	17.7
	N_2	%	63.9	60.2	63.0
Electrostatic Precipitators					
Flue dust from precipitators		t/h	8.0	7.4	6.9
Gas after precipitator		m^3/h	137300	117300	109400
- temperature		°C	360	360	360
- analysis	H_2	%	0.15	0.15	0.15
	H_2S	%	1.3	1.55	1.4
	CO	%	1.8	1.8	1.8
	COS	%	1.25	1.3	1.25
	SO_2	%	2.2	2.25	2.2
	$S_2, \ldots, S_8$	%	2.15	2.5	2.4
	H_2O	%	11.45	12.5	11.4
	CO_2	%	16.7	18.45	17.3
	N_2	%	63.0	59.5	62.1

3.2.2
Sulphur Plant Area

Sulphur condensing boiler and demister				
Sulphur production	t/h	22.2	22.9	20.0
Steam production	t/h	18.9	16.9	15.4
- pressure	bar	5.5	5.5	5.5
- feed water temperature	°C	150	150	150
Steam production	t/h	8.0	7.4	6.7
- pressure	bar	1.7	1.7	1.7
- feed water temperature	°C	105	105	105
Gas after demister	m^3/h	134400	114400	106800
- temperature	°C	150	150	150
Gas reheater				
Oil	t/h	1.7	1.45	1.3
Combustion air	m^3/h	19900	17000	15700
Gas after reheater	m^3/h	155900	132800	123900
- temperature	°C	435	435	435

		ALT	1	2	3
Hot catalyzer					
Gas after catalyzer		m^3/h	155200	132200	123400
- temperature		°C	480	480	480
- analysis	H_2S	%	1.8	2.0	1.8
	CO	%	0.12	0.12	0.12
	COS	%	0.22	0.22	0.22
	SO_2	%	1.25	1.25	1.2
	S_2, S_4, S_6	%	0.54	0.56	0.55
	H_2O	%	11.7	12.7	11.7
	CO_2	%	18.9	20.5	19.4
	N_2	%	65.5	62.65	64.9
Gas cooling boiler					
Sulphur production		t/h	1.3	1.2	1.1
Steam production		t/h	28	24	22
- pressure		bar	5.5	5.5	5.5
- feed water temperature		°C	150	150	150
Gas after boiler		m^3/h	154600	131700	122800
- temperature		°C	250	250	250
Cold catalyzers					
Gas after catalyzers		m^3/h	154100	131300	122500
- temperature		°C	261	263	262
- analysis	H_2S	%	0.44	0.52	0.46
	CO	%	0.11	0.11	0.11
	COS	%	0.18	0.18	0.18
	SO_2	%	0.58	0.51	0.53
	S_6, S_8	%	0.42	0.46	0.43
	H_2O	%	13.1	14.3	13.2
	CO_2	%	19.1	20.7	19.6
	N_2	%	66.1	63.2	65.5

		ALT	1	2	
Sulphur condensing towers and demister					
Sulphur production		t/h	5.7	5.3	4.7
Gas after demister		m^3/h	156500	133400	124600
- temperature		°C	135	135	135
- analysis	H_2S	%	0.44	0.51	0.45
	CO	%	0.11	0.11	0.10
	COS	%	0.17	0.18	0.17
	SO_2	%	0.57	0.5	0.52
	S_8	%	0.01	0.01	0.01
	H_2O	%	13.05	14.2	13.1
	CO_2	%	18.8	20.4	19.3
	O_2	%	0.4	0.4	0.4
	N_2	%	66.5	63.7	66.0
Sulphur cooling boilers					
Steam production		t/h	12.8	11.3	10.2
- pressure		bar	1.7	1.7	1.7
- feed water temperature		°C	105	105	105

3.2.3
Matte Roasting Area

Roasting furnace					
PSF matte (dry)		t/h	-	22.6	-
- moisture (wet basis)		%	-	3.4	-
PSF flue dust (dry)		t/h	-	9.2	-
- moisture (wet basis)		%	-	3.4	-
Air to roasting furnace		m^3/h	-	52700	-
- temperature		°C	-	40	-
coarse calcine		t/h	-	18	-
Fine calcine		t/h	-	12	-
Saturated steam from cooling coils 70 bar		t/h	-	20	-
- feed water temperature		°C	-	200	-

			1	2	3
Gas from roasting furnace		m^3/h	-	50800	-
- temperature		°C	-	1015	-
- analysis	SO_2	%	-	7.5	-
	H_2O	%	-	8.6	-
	CO_2	%	-	3.9	-
	O_2	%	-	2.7	-
	N_2	%	-	77.3	-

30 March 1983/RJA

MATERIAL BALANCE OF THE FLASH SMELTING FURNACE

ALTERNATIVE 1

	Amount		S		Fe		SiO_2		Al_2O_3		C
	kg	%	kg/h	%	kg/h	%	kg/h	%	kg/h	%	kg/h
In:											
Pyrite	83500	39.5	32940	35.7	29830	15.3	12760	2.1	1740	1.0	830
Top Shale	6000	10.8	650	11.2	670	50.4	3020	13.2	790	2.6	160
Flue dust	10000	0.7	70	24.1	2410	31.2	3120	12.8	1280	11.6	1160
Coal	20950	0.5	105	3.6	760	10.4	2180	5.2	1090	64.8	13570
			33765		33670		21080		4900		15720
Out:											
Slag	64540	1.65	1060	48.4	31260	27.8	17960	5.6	3620		
Flue dust	10000	0.7	70	24.1	2410	31.2	3120	12.8	1280	11.6	1160
			1130		33670		21080		4900		1160

MATERIAL BALANCE OF THE FLASH SMELTING FURNACE

ALTERNATIVE 2

	Amount kg/h	%	S kg/h	%	Fe kg/h	%	SiO_2 kg/h	%	Al_2O_3 kg/h	%	C kg/h
In:											
Pyrite	83500	39.5	32940	35.7	29830	15.3	12760	2.1	1740	1.0	830
Calcine dust	2500	0.8	20	65.1	1630	4.0	100	3.2	80		
Coal	19650	0.5	100	3.6	710	10.4	2040	5.2	1020	64.8	12730
			33060		32170		14900		2840		13560
Out:											
Matte	22600	22.1	5000	66.7	15090	1.5	340	0.2	50		
Slag	33200	1.8	600	44.5	14790	35.8	11870	5.1	1680		
Flue dust	9230	5.6	520	24.8	2290	29.1	2690	12.0	1110	11.5	1060
			6120		32170		14900		2840		1060

29 March 1983/RJA

MATERIAL BALANCE OF THE ROASTING FURNACE

ALTERNATIVE 2

	Amount		S		Fe		SiO_2		Al_2O_3		C
	kg/h	%	kg/h	%	kg/h	%	kg/h	%	kg/h	%	kg/h
In:											
FSF Matte	22600	22.1	5000	66.7	15090	1.5	340	0.2	50		
FSF Flue dust	9230	5.6	520	24.8	2290	29.1	2690	12.0	1110	11.5	1060
	31830		5520		17380		3030		1160		1060
Out:											
Coarse calcine	18000	0.2	35	56.2	10120	12.2	2190	4.1	740		
Fine calcine	12000	0.45	55	60.5	7260	7.0	840	3.5	420		
	30000		90		17380		3030		1160		

MATERIAL BALANCE OF THE FLASH SMELTING FURNACE

7 November 1893/RJA

ALTERNATIVE 3

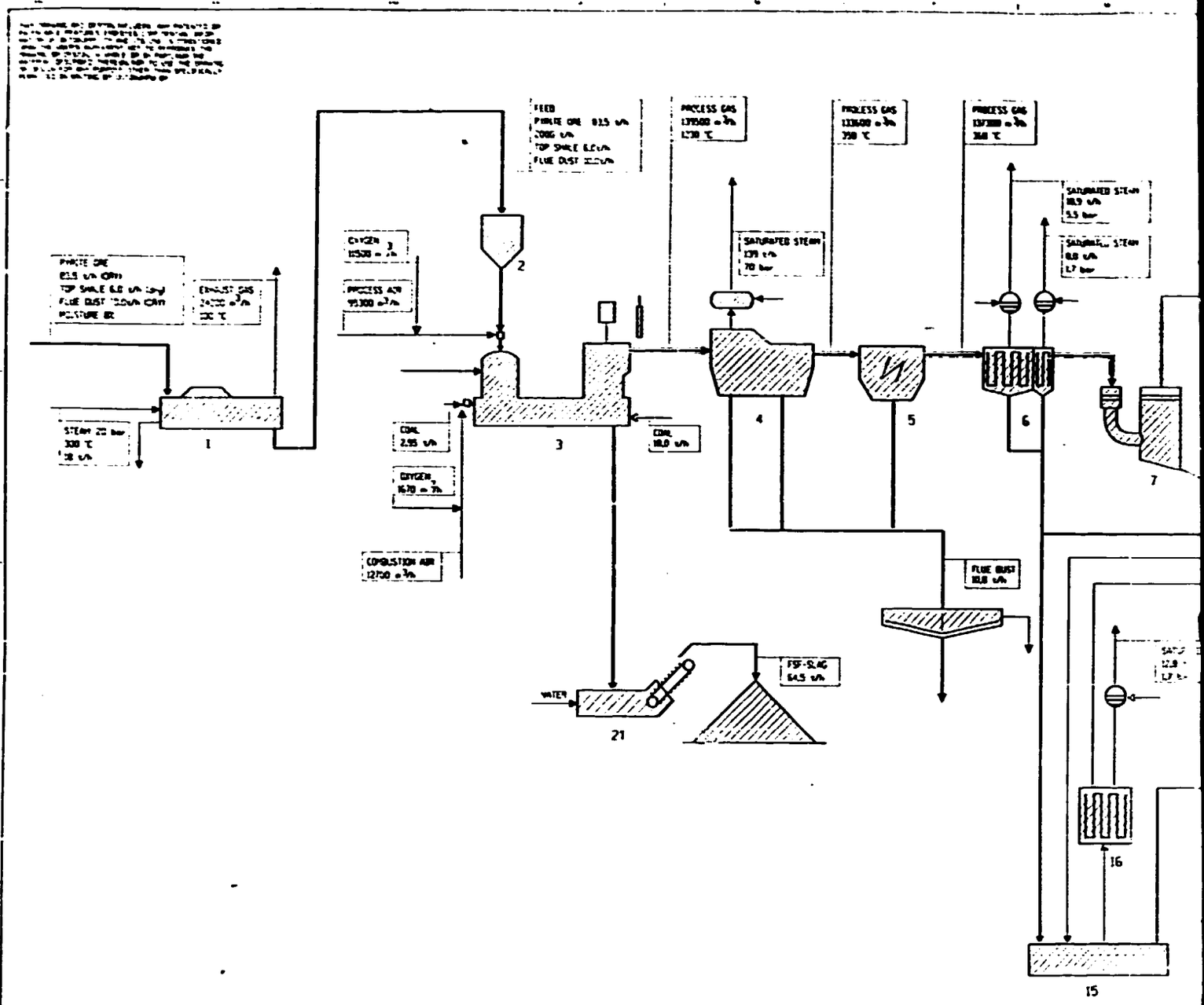
	Amount		S		Fe		SiO_2		Al_2O_3		C
	kg	%	kg/h	%	kg/h	%	kg/h	%	kg/h	%	kg/h
In:											
Pyrite	83500	39.5	32940	35.7	29830	15.3	12760	2.1	1740	1.0	830
Flue dust	8630	4.8	410	25.7	2220	29.5	2550	11.9	1030	10.7	930
Coal	17150	0.5	85	3.6	620	10.4	1780	5.2	890	64.8	11120
			33435		32670		17090		3660		12880
Out:											
Matte	17160	22.1	3780	66.6	11420	1.5	260	0.3	45		
Slag	42990	1.8	770	44.3	19030	33.2	14280	6.0	2585		
Flue dust	8630	4.8	410	25.7	2220	29.5	2550	11.9	1030	10.7	930
			4960		32670		17090		3660		930

3.3
Process flowsheets

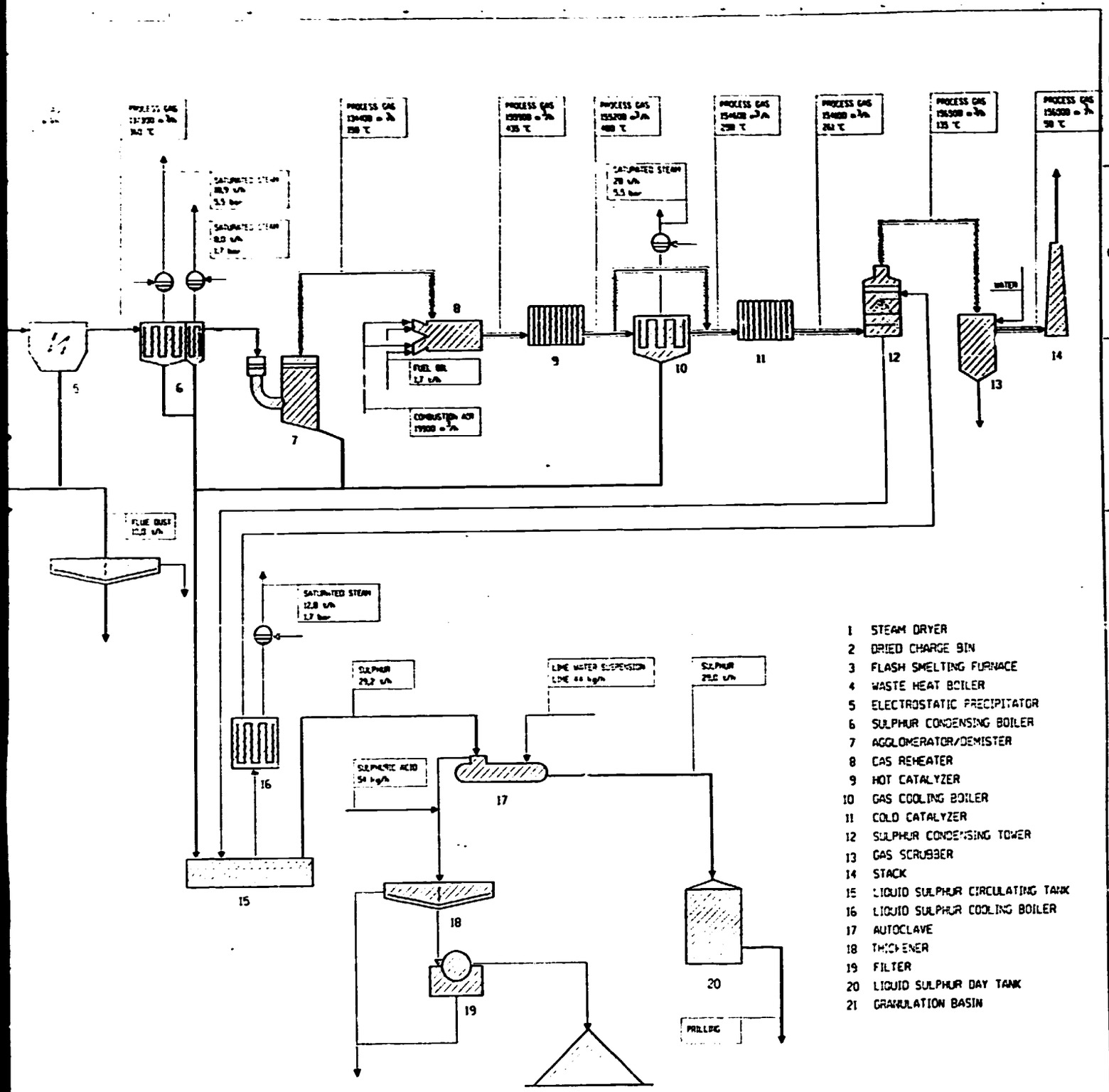
Drawing No. 360 100 901 002-1 REV.0
- Alternative 1

Drawing No. 360 100 901 003-1 REV.0
- Alternative 2

Drawing No. 360 100 901 007-1 REV.0
- Alternative 3



SECTION 1



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 GAS SCRUBBER
14 STACK
15 LIQUID SULPHUR CIRCULATING TANK
16 LIQUID SULPHUR COOLING BOILER
17 AUTOCLAVE
18 THICKENER
19 FILTER
20 LIQUID SULPHUR DAY TANK
21 GRANULATION BASIN

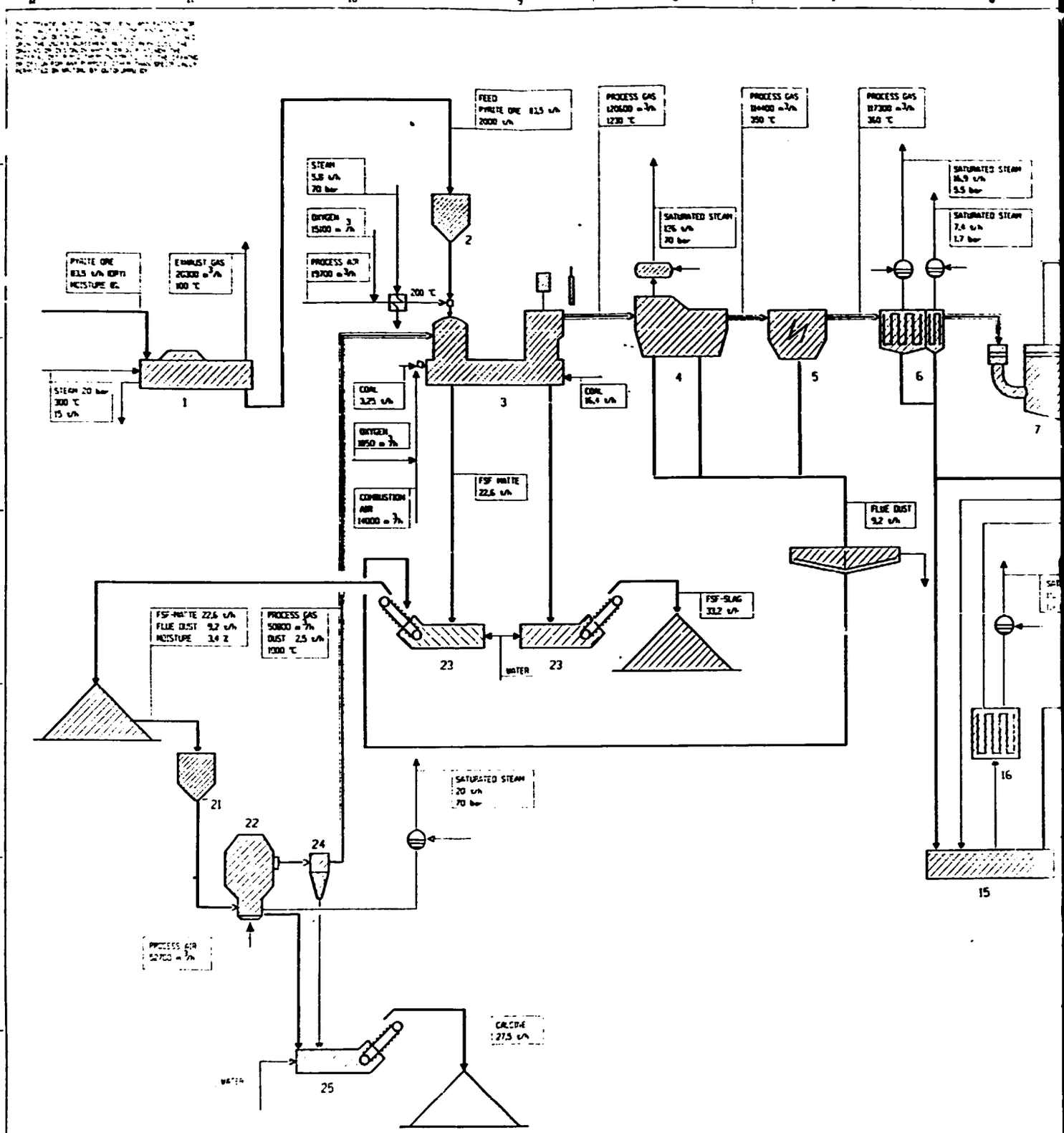
NOTE: ALL GAS VOLUMES AT NORMAL STATE (101.325 kPa ,0°C)

SECTION 2

PRELIMINARY

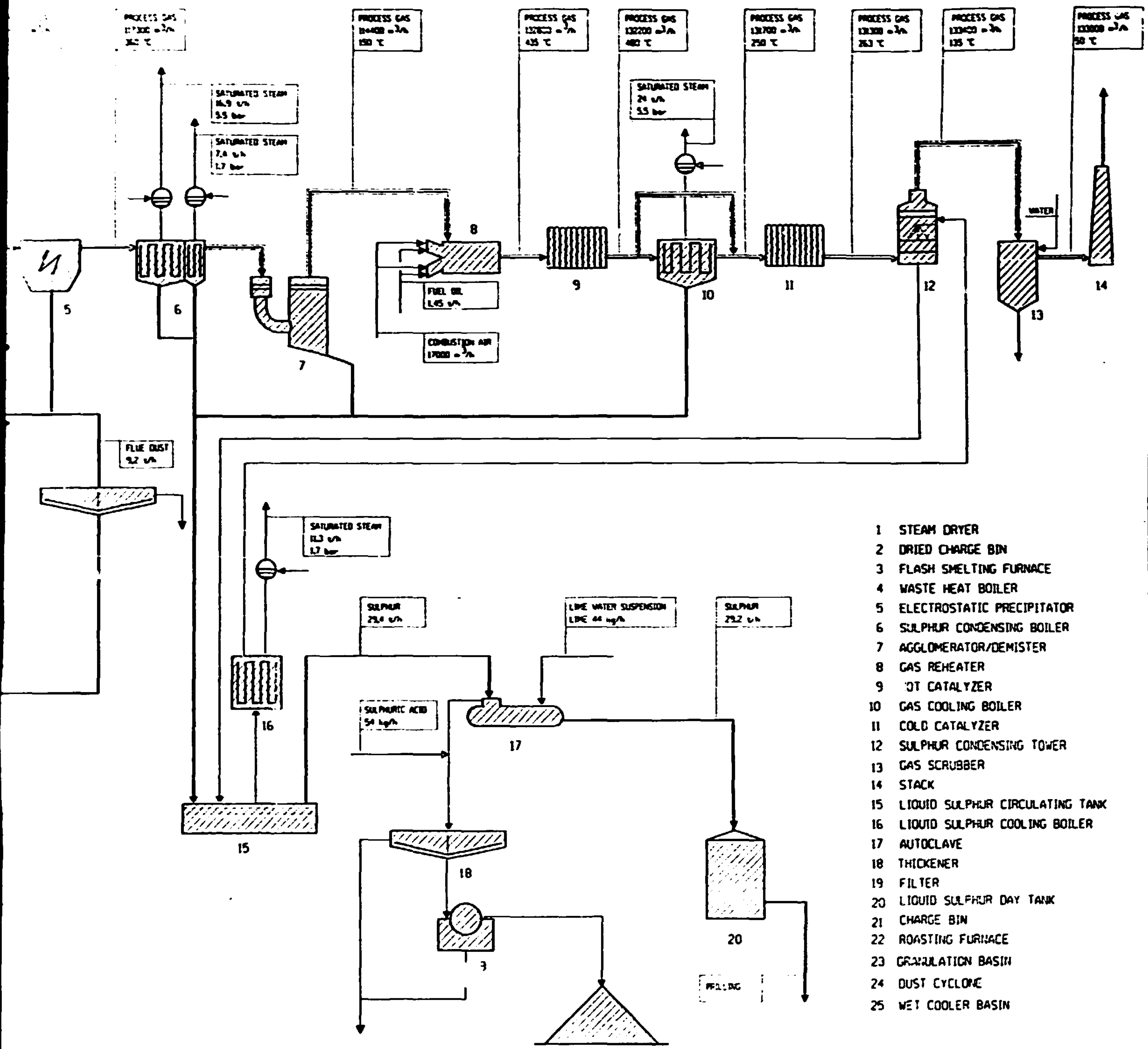
OUTOKUMPU OY ENGINEERING DIVISION	DESIGNED	3. MAY -83	PJA
	CHECKED	18. May -83	RA
	APPROVED	12 May -83	MR
CLIENT: PYRITES, PHOSPHATES & CHEMICALS LTD	CLIENTS DWG NO.		
PROJECT: PPCL PYRITE SMELTER			
DRWG TITLE: FLASH SMELTER AND SULPHUR PLANT PROCESS FLOW SHEET ALTERNATIVE 1	PATENT MARK	A...DWG	
		DWG NO. 360 100 901 002-1	ISSUE C

0	FOR INFORMATION	5.MAY -83	MR	PJA MR



SECTION 1

DRAWING NO.	REFERENCE DRAWING	REVISIONS							
								0	FOR INF



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 GAS SCRUBBER
14 STACK
15 LIQUID SULPHUR CIRCULATING TANK
16 LIQUID SULPHUR COOLING BOILER
17 AUTOCLAVE
18 THICKENER
19 FILTER
20 LIQUID SULPHUR DAY TANK
21 CHARGE BIN
22 ROASTING FURNACE
23 GRANULATION BASIN
24 DUST CYCLONE
25 WET COOLER BASIN

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

SECTION 2

PRELIMINARY

OUTOKUMPU OY
ENGINEERING DIVISION

DESIGNED	3.MAY -83	
CHECKED	13.May-83	
APPROVED	12.May-83	

CLIENT: PYRITES, PHOSPHATES & CHEMICALS LTD

CLIENTS DWG NO.

PROJECT: PPCL PYRITE SMELTER

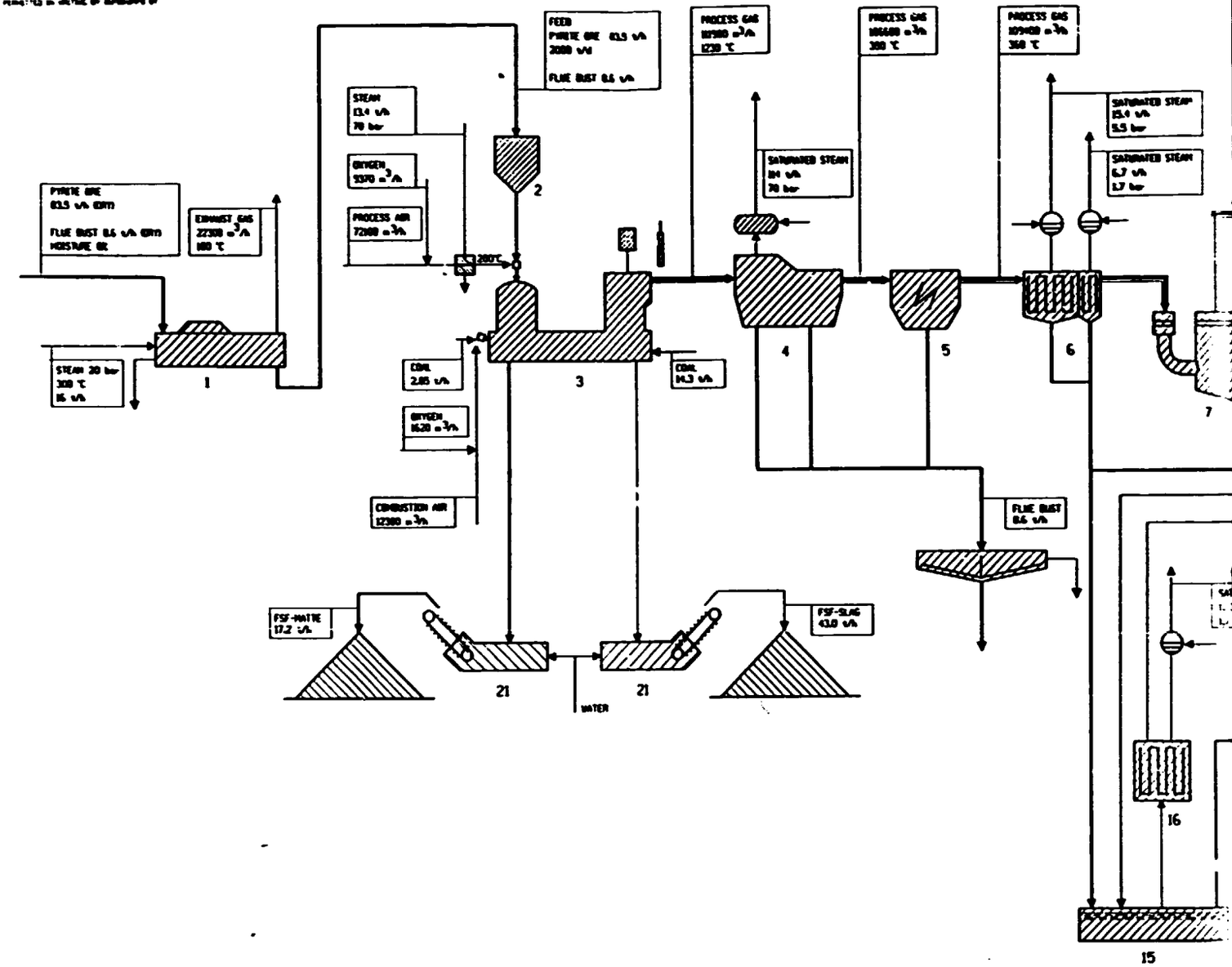
DRAWING TITLE: FLASH SMELTER AND SULPHUR PLANT PROCESS FLOW SHEET ALTERNATIVE 2

ORIGINAL SCALE: —

REF. DWG

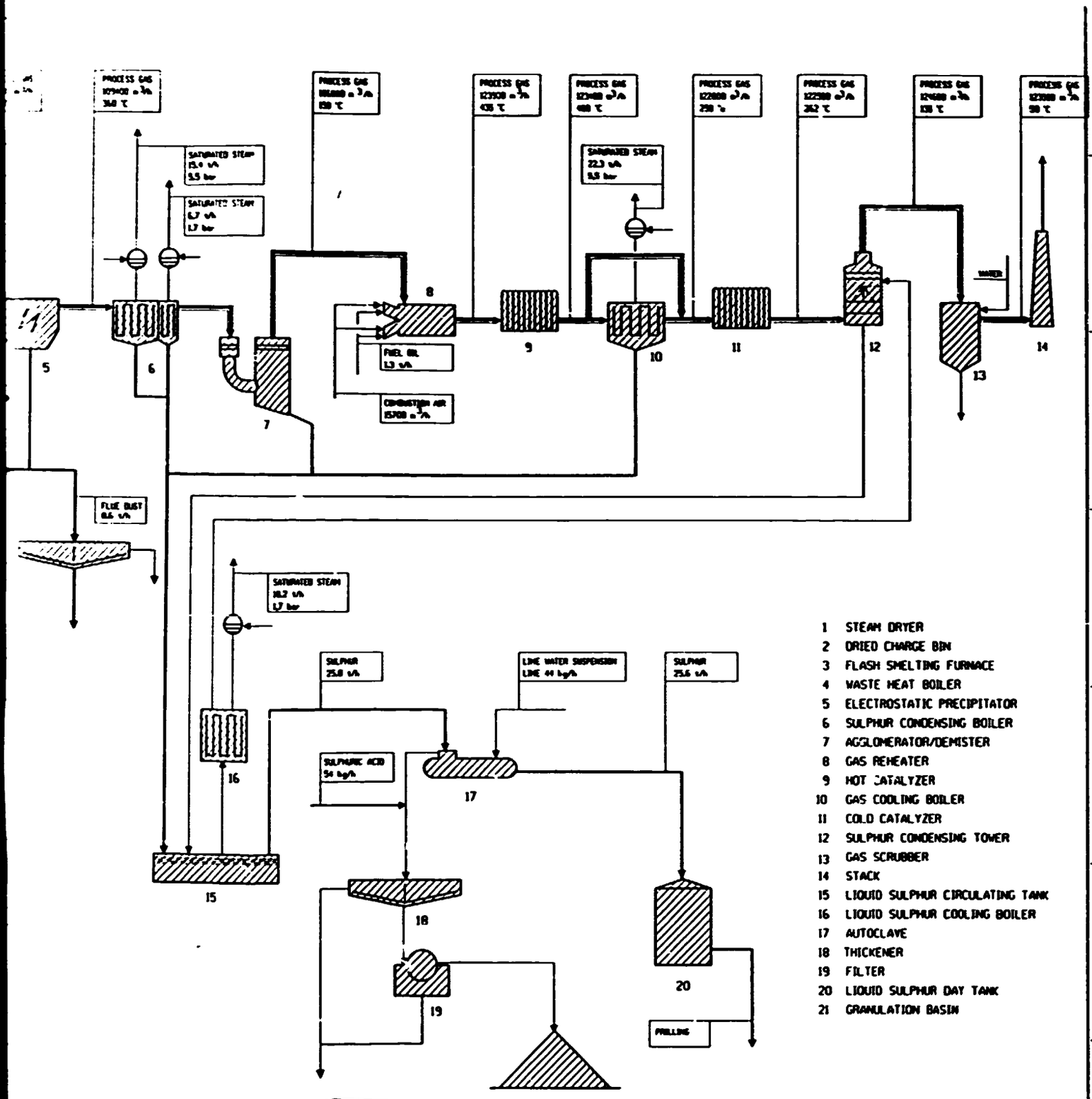
DWG NO. 360 100 901 003-1 | REV. 0

REV.		REVISION	DATE	DRAWN	CHECKED	APPROVED
0		FOR INFORMATION	5.MAY -83	MPn		



SECTION 1

DRAWING NO.	REFERENCE DRAWING	REVISIONS	DATE



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
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15 LIQUID SULPHUR CIRCULATING TANK
16 LIQUID SULPHUR COOLING BOILER
17 AUTOCLAVE
18 THICKENER
19 FILTER
20 LIQUID SULPHUR DAY TANK
21 GRANULATION BASIN

NOTE: ALL GAS VOLUMES AT NORMAL STATE 1101,325 kPa ,0°C)

SECTION 2

PRELIMINARY

OUTOKUMPU OY ENGINEERING DIVISION	DESIGNED	7.NOV.1983	RJA
	CHECKED	29 Nov 1983	RJA
	APPROVED		
CLIENT: PYRITES, PHOSPHATES & CHEMICALS LTD	CLIENT'S DWG NO.		
PROJECT: PPCL PYRITE SMELTER			
DRAWING TITLE: FLASH SMELTER AND SULPHUR PLANT PROCESS FLOW SHEET ALTERNATIVE 3	SCALE: —	REF. DWG	
		DWG NO. 360 100 901 006-1	REV. NO. 0

0	FOR INFORMATION	7.NOV.1983	RJA	RJA
REV. NO.	REVISIONS	DATE	DRAWN	CHECKED

4
PLANT DESIGN

4.1 Plant description

4.2 List of equipment with main technical data

4
PLANT DESIGN

4.1
Plant description

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

The smelter, sulphur plant and power plant are located on the southern side of the railway. The pyrite ore stockpile is first in the west and then the smelter and sulphur plant. Between the smelter and the main railway the power plant with coal plant is located. The sulphur plant is arranged in a U form in order to minimize gas duct lengths to the main stack from the sulphur process and power plant. Feed water and steam pipe lengths between boilers and power plant are also as short as possible in such a plant arrangement. The sulphur prilling tower is at the east end of the sulphur plant near the railway. The prilled sulphur loading station is arranged at the railway so that sulphur can be fed to trailway waggons or trucks.

The oxygen plant is located on the other side of the railway, where the prevailing wind blows away from the plant towards the smelter.

Pyrite ore day bins are located in the west from the smelter near the pyrite stockpile. Pyrite is proportioned and transported by the belt conveyors to steam dryers near the flash furnace.

In alternative 1 only slag is tapped and granulated from the flash furnace. This granulate is transported by the belt conveyor to a stockpile southwest from the smelter.

In alternative 2 both slag and matte are granulated from the flash furnace. The matte is conveyed to a stockpile in the south-west from the smelter. From this stockpile matte is taken by a front-end loader to conveyors and then transported to roaster feed bins. Products with no value, slag and iron calcine, are transported far enough by the belt conveyors in order to ensure their further handling without disturbing feed material tranportation. Preliminarily slag is piled to the area in the north-east from day bins and iron calcine in the south-west from matte stockpile.

Coal is piled near the main railway in the west from the power plant where it is charged by loaders to a belt conveyor for raw coal bins of the coal plant which is located in connection with the power plant. The head tank for flash furnace jacket cooling and softed water tank are located on the Hathini hill. The water treatment plant for ground water can be located in the neighbourhood of the base pump station.

4.2
List of equipment with main technical data

4.2.0 CODING

4.2.1 List of equipment
Smelter and sulphur plant
Alternative 1

4.2.2 List of equipment
Smelter and sulphur plant
Alternative 2

4.2.0
Coding

CODE	AREA
210	DRYER AND FSF FEED AREA
220	FLASH SMELTING FURNACE AREA
230	FSF PROCESS GAS HANDLING AREA
240	FSF FLUE DUST HANDLING AREA
310	SULPHUR RECOVERING AREA
320	SULPHUR HANDLING AREA
330	WASTE LIQUID HANDLING AREA
410	ROASTING FEED AREA
420	ROASTING FURNACE AREA

EQ.GROUP	EQ.TYPE	EQ.CODE
Basins	Wet cooler basin	106
	Granulation basin	108
Bins	Day bin	116
	Dried charge bin	117
	Feed bin	117
Boilers	Waste heat boiler	124
	Boilers, others	129
Burners	Coal dust burner	131
	Oil burner	132
	Concentrate burner	435
Casting eq.	Launder	140
Conveyors	Belt conveyor	167
	Drag conveyor	168
	Pneumatic conveyor	170
	Screw conveyor	172
	Scraper conveyor	174
Dryuers	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
	Roasting furnace	262
Heat-transfer eq.	Gas reheater	281
	Process air preheater	281
	Heat exchanger	281

4 Eq.group	Eq.type	Eq.code
Lifting devices	Overhead travelling crane	318
	Crane	
Pumps	Pump	370
	Dosage pump	371
	Ejector	372
	Slurry pump	374
	Vacuum pump	375
	Water pump	376
Screens	Vibrating screen	411
Separating eq.	Bag filter	417
	Cyclone	419
	Demister	420
	Electrostatic precipitator	421
	Scrubber	423
Special machines and equipment	Agglomerator	431
	Hot catalyzer	433
	Cold catalyzer	433
	Sulphur condensing tower	464
	Sulphur prilling tower	509
Tanks	Tank	510
	Autoclave	511
	Measuring tank	515
	Mixing tank	516
	Pump tank	518
	Jacket and spray water tank	519
	Storage tank	519
	Floor sump	520
	Reactor tank	521
Thickeners	Thickener	532
Valves	Disc valve	562
	Emergency valve	569

OUTOKUMPU OY
ENGINEERING DIVISION

4.2.1
List of equipment

Smelter and sulphur plant
Alternative 1

Equipment diagram, drawing No. 360 100 901 004-9

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 CCL ALTI
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

210-116-0100

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-0200

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-0300

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-0400

EQUIPMENT TYPE	DAY BIN
SERVICE	TOP SHALE DAY BIN
VOLUME	(TOTAL) 300 M3
MATERIAL	CONCRETE

210-117-0100

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 300 M3
MATERIAL	STEEL

210-117-0200

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 50 M3
MATERIAL	STEEL

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

210-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	140 T/H
MAIN DIMENSIONS	LENGTH 50000 MM
	WIDTH 1000 MM

210-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	140 T/H
MAIN DIMENSIONS	LENGTH 105000 MM
	WIDTH 1000 MM

210-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR TOP SHALE
CAPACITY	20 T/H
MAIN DIMENSIONS	LENGTH 7000 MM
BELT WIDTH	650 MM

210-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	80 T/H
MAIN DIMENSIONS	LENGTH 18000 MM
	WIDTH 800 MM

210-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	80 T/H
MAIN DIMENSIONS	LENGTH 18000 MM
	WIDTH 800 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALTI CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

210-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
SERVICE	FOR DRIED CHARGE
CAPACITY	150 T/H

210-194-0100

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	70 T/H

210-194-0200

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	70 T/H

210-212-0100

EQUIPMENT TYPE	EXHAUST AIR FAN
SERVICE	EXHAUST AIR FAN FOR BAG FILTER
CAPACITY	30000 NM3/H

210-218-0100

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-218-0200

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

210-218-0300

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-218-0400

EQUIPMENT TYPE	BELT FEEDER
SERVICE	BELT FEEDER FOR TOP SHALE
CAPACITY	2-20 T/H
BELT LENGTH	7000 MM
BELT WIDTH	650 MM

210-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	140 T/H

210-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	140 T/H

210-417-0100

EQUIPMENT TYPE	BAG FILTER
CAPACITY	30000 NM3/H

CLIENT :PPLL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

220-108-0100

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR SLAG
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-108-0200

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR SLAG
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-131-0100

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0200

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0300

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0400

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALTI CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

220-131-0500

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0600

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-132-0100

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL

220-132-0200

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL

220-140-0100

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0200

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

220-140-0300

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0400

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0500

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-140-0600

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR SLAG
CAPACITY	100 T/H
MAIN DIMENSIONS	LENGTH 110000 MM WIDTH 650 MM

220-174-0100

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR SLAG
CAPACITY	100 T/H

220-174-0200

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR SLAG
CAPACITY	100 T/H

220-204-0100

EQUIPMENT TYPE	REMOVABLE EMERGENCY STACK FOR FSF

220-212-0100

EQUIPMENT TYPE	PROCESS AIR FAN
CAPACITY	60000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C

220-212-0200

EQUIPMENT TYPE	PROCESS AIR FAN
CAPACITY	60000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C

220-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
CAPACITY	20000 NM3/H
PRESSURE	5 KPA
TEMPERATURE	35 C

220-223-0100

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	7-70 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 800 MM

220-223-0200

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	7-70 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 800 MM

220-261-0100

EQUIPMENT TYPE	FLASH SMELTING FURNACE

220-289-0100

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
CAPACITY	700 M3/H

220-289-0200

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	700 M3/H

220-289-0300

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
CAPACITY	300 M3/H

220-289-0400

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	300 M3/H

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :05.05.83

220-318-0100

EQUIPMENT TYPE	OVERHEAD TRAVELING CRANE
LIFTING CAPACITY	10 T

220-376-0100

EQUIPMENT TYPE	JACKET WATER PUMP
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0200

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	STAND BY
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0300

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	EMERGENCY
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0400

EQUIPMENT TYPE	SPRAY WATER PUMP
CAPACITY	300 M3/H
PRESSURE	600 KPA

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

220-376-0500

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	STAND BY
CAPACITY	300 M3/H
PRESSURE	600 KPA

220-376-0600

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	EMERGENCY
CAPACITY	300 M3/H
PRESSURE	600 KPA

220-376-0700

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-376-0800

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-376-0900

EQUIPMENT TYPE	GRANULATION WATER PUMP
SERVICE	STAND BY
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-435-0100

EQUIPMENT TYPE	CONCENTRATE BURNER

220-518-0100

EQUIPMENT TYPE	WATER TANK
SERVICE	OVERFLOW WATER TANK
VOLUME	20 M3
MATERIAL	CONCRETE

220-519-0100

EQUIPMENT TYPE	JACKET WATER TANK
VOLUME	400 M3
MATERIAL	CONCRETE

220-519-0200

EQUIPMENT TYPE	SPRAY WATER TANK
VOLUME	300 M3
MATERIAL	CONCRETE

220-569-0100

EQUIPMENT TYPE	EMERGENCY CAMPER BETWEEN FSF-WHB

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

230-124-0100

EQUIPMENT TYPE	WASTE HEAT BOILER
CAPACITY	SATURATED STEAM 165 T/H
PRESSURE	70 BAR
GAS FLOW	165000 NM3/H
TEMPERATURE	
INLET	1250 C
OUTLET	350 C

230-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	85000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C

230-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	85000 NM3/H
PRESSURE	4 KPA
TEMPERATUPE	360 C

230-372-0100

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-PASS EJECTOR BETWEEN WHB AND EP.

230-372-0200

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.

230-372-0300

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS
CLIENT NO :
REVISION :0 DATE :09.05.83

230-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP
CAPACITY	1500 M3/H
HEAD	40 M

230-376-0200

EQUIPMENT TYPE	WATER PUMP
TYPE	TURBINE DRIVE WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP FOR EMERGENCY
CAPACITY	1500 M3/H
HEAD	40 M

230-421-0100

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	85000 NM3/H
TEMPERATURE	360 C

230-421-0200

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	85000 NM3/H
TEMPERATURE	360 C

230-562-0100

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :366 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

230-562-J200

EQUIPMENT TYPE	DISC VALVE
SERVICE	FCR EP.

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

240-140-0100

EQUIPMENT TYPE	LAUNDER
TYPE	
SERVICE	FOR WHB DUST
DIMENSIONS	LENGTH 4000 MM

240-140-0200

EQUIPMENT TYPE	LAUNDER
TYPE	
SERVICE	FOR EP DUST
DIMENSIONS	LENGTH 25000 MM

240-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR FOR WHB DUST
CAPACITY	15 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 800 MM

240-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-168-0300

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-168-0400

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-168-0500

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-374-0100

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR COLLECTION TANK
CAPACITY	130 M3/H

240-374-0200

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR COLLECTION TANK
CAPACITY	130 M3/H

240-374-0300

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 G01 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

240-374-0400	
EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H
240-376-0100	
EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW
CAPACITY	130 M3/H
240-376-0200	
EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW
CAPACITY	130 M3/H
240-510-0100	
EQUIPMENT TYPE	COLLECTION TANK
SERVICE	FOR WHB AND EP DUST
VOLUME	10 M3
MATERIAL	CONCRETE
240-518-0100	
EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW WATER PUMP TANK
VOLUME	500 M3
MATERIAL	CONCRETE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

240-520-0100

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0200

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0300

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0400

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0500

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

CLIENT : PPCL
DOCUMENT: EQUIPMENT LIST(AT)
OUTOKUMPU NO :360 100 900 CCI ALTI
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

240-532-0100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 30000 MM
MATERIAL	CONCRETE

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

310-129-0100

EQUIPMENT TYPE	SULPHUR CONDENSING BOILER
CAPACITY	SATURATED STEAM 22 T/H (HIGH)
	SATURATED STEAM 9 T/H (LOW)
PRESSURE	5,5 BAR
	1,7 BAR
GAS FLOW	165000 NM3/H
TEMPERATURE	INLET 360 C
	OUTLET 150 C

310-129-0200

EQUIPMENT TYPE	GAS COOLING BOILER
CAPACITY	SATURATED STEAM 32 T/H
PRESSURE	5,5 BAR
GAS FLOW	155000 NM3/H
TEMPERATURE	INLET 480 C
	OUTLET 200 C

310-204-0100

EQUIPMENT TYPE	STACK
SERVICE	FOR SULPHUR LINE AND POWER PLANT
HEIGHT	150 M

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
CAPACITY	85000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	170 C

310-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	85000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	170 C

310-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
SERVICE	FGR GAS REHEATER
CAPACITY	23000 NM3/H
PRESSURE	17 KPA
TEMPERATURE	35 C

310-212-0400

EQUIPMENT TYPE	COMBUSTION AIR FAN
CAPACITY	23000 NM3/H
PRESSURE	17 KPA
TEMPERATURE	35 C

310-212-0500

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	90000 NM3/H
PRESSURE	2,5 KPA
TEMPERATURE	140 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

310-212-0600

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	90000 NM3/H
PRESSURE	2,5 KPA
TEMPERATURE	140 C

310-281-0100

EQUIPMENT TYPE	GAS REHEATER
SERVICE	FOR PROCESS GAS
CAPACITY	GAS INLET 160000 NM3/H OUTLET 160000 NM3/H
TEMPERATURE	INLET/OUTLET 150/435 C

310-370-0100

EQUIPMENT TYPE	FUEL OIL PUMP
TYPE	
SERVICE	FOR GAS REHEATER
CAPACITY	2,5 M3/H

310-370-0200

EQUIPMENT TYPE	FUEL OIL PUMP
SERVICE	FOR GAS REHEATER
CAPACITY	2,5 M3/H

310-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	300 M3/H
PRESSURE	600 KPA

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALTI
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

310-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	300 M3/H
PRESSURE	600 KPA

310-420-0100

EQUIPMENT TYPE	DEMISTER
CAPACITY	165000 NM3/H
TEMPERATURE	150 C

310-420-0200

EQUIPMENT TYPE	DEMISTER
CAPACITY	180000 NM3/H
TEMPERATURE	135 C

310-423-0100

EQUIPMENT TYPE	SCRUBBER
SERVICE	FOR PROCESS GAS
CAPACITY	180000 NM3/H
GAS TEMPERATURE	INLET 135 C
	OUTLET 50 C

310-431-0100

EQUIPMENT TYPE	AGGLOMERATOR
CAPACITY	165 000 NM3/H
TEMPERATURE	150 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT.
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

310-433-0100

EQUIPMENT TYPE	HOT CATALYZER
CAPACITY	175000 NM3/H
TEMPERATURE	460 C
MATERIAL	STAINLESS STEEL

310-433-0200

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	90000 NM3/H
TEMPERATURE	260 C
MATERIAL	STEEL

310-433-0300

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	90000 NM3/H
TEMPERATURE	260 C
MATERIAL	STEEL

310-464-0100

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
GAS FLOW	90000 NM3/H
TEMPERATURE	INLET 260 C
	OUTLET 135 C

310-464-0200

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
GAS FLOW	90000 NM3/H
TEMPERATURE	INLET 260 C
	OUTLET 135 C

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

310-532-0100

EQUIPMENT TYPE	THICKENER
SERVICE	FOR SCRUBBER
DIMENSIONS	DIAMETER 11000 MM
MATERIAL	KCCD

310-532-0200

EQUIPMENT TYPE	THICKENER
SERVICE	FOR SCRUBBER
DIMENSIONS	DIAMETER 11000 MM
MATERIAL	KCCD

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-117-0100

EQUIPMENT TYPE	BIN
SERVICE	LIME BIN
VOLUME	5 M3
MATERIAL	STEEL

320-129-0100

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0200

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0300

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0400

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 650 MM

320-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 650 MM

320-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING SULPHUR
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 80000 MM
	WIDTH 650 MM

320-172-0100

EQUIPMENT TYPE	SCREW CONVEYOR
SERVICE	FOR LIME
CAPACITY	0-200 KG/H

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-212-0100

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0200

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0300

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0400

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

320-214-J100

EQUIPMENT TYPE	AIR BLOWER
SERVICE	FOR PRILLING TOWER
CAPACITY	2000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C

320-244-J100

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR

320-244-J200

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR

320-370-J100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-J200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0500

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0600

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0700

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :VS REVISION :C DATE :09.05.83

320-370-J800

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-J900

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-1000

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-1100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	50 M3/H
HEAD	25 M

320-370-1200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	50 M3/H
HEAD	25 M

CLIENT : PPCL
DOCUMENT: EQUIST(AT)
OUTOKUMPU NO :320 100 900 G01 ALTI
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

320-370-1300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	5 M3/H
HEAD	25 M

320-370-1400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	5 M3/H
HEAD	25 M

320-370-1500

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1600

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1700

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 G01 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-370-1800

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1900

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2000

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

320-370-2300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA

320-370-2400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA

320-371-0100

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

320-371-0200

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

320-371-0300

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK STAND BY
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS
CLIENT NO :
REVISION :C DATE :09.05.83

320-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	150 T/H

320-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	150 T/H

320-509-0100

EQUIPMENT TYPE	PRILLING TOWER
SERVICE	SULPHUR PRILLING TOWER
DIMENSIONS	DIAMETER 30000 MM, HEIGHT 40000 MM WALL THICKNESS 350 MM
MATERIAL	CONCRETE

320-511-0100

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 29 T/H
VOLUME	25 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)

320-511-0200

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 29 T/H
VOLUME	25 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-515-0100

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	6 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-515-0200

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	6 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-516-0100

EQUIPMENT TYPE	MIXING TANK
SERVICE	FOR LIME MILK
VOLUME	25 M3
MATERIAL	STEEL

320-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	LIQUID SULPHUR CIRCULATING TANK
VOLUME	110 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0200

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0300

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0400

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	10 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0500

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-518-0600

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE
	STEAM HEATING PIPES

320-518-0700

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE
	STEAM HEATING PIPES

320-519-0100

EQUIPMENT TYPE	TANK
SERVICE	SULPHUR TANK
VOLUME	100 M3
MATERIAL	STEEL
	STEAM HEATING PIPES

320-519-0200

EQUIPMENT TYPE	DAY TANK
SERVICE	SULPHUR DAY TANK
VOLUME	400 M3
MATERIAL	STEEL
	STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

330-212-0100

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	5000 NM3/H
PRESSURE	500 PA

330-243-0100

EQUIPMENT TYPE	DRUM FILTER
FILTER AREA	4,5 M2

330-370-0100

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP
CAPACITY	2 M3/H
HEAD	15 M

330-370-0200

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP
CAPACITY	2 M3/H
HEAD	15 M

330-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP
CAPACITY	15 M3/H
HEAD	20 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

330-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP
CAPACITY	15 M3/H
HEAD	20 M

330-375-0100

EQUIPMENT TYPE	VACULM PUMP
CAPACITY	4,5 M3/MIN
VACUUM	UNDER PRESSURE 600 MM HG

330-510-0100

EQUIPMENT TYPE	TANK
SERVICE	COOLING TANK
VOLUME	5 M3
MATERIAL	ACID PROOF STEEL

330-510-0200

EQUIPMENT TYPE	TANK
SERVICE	SULPHURIC ACID TANK
VOLUME	3 M3
MATERIAL	STEEL

330-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	UNDERFLOW PUMP TANK
VOLUME	5 M3
MATERIAL	ACID PROOF STEEL

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN : VS

CLIENT NO :
REVISION : C DATE :09.05.83

330-518-0200

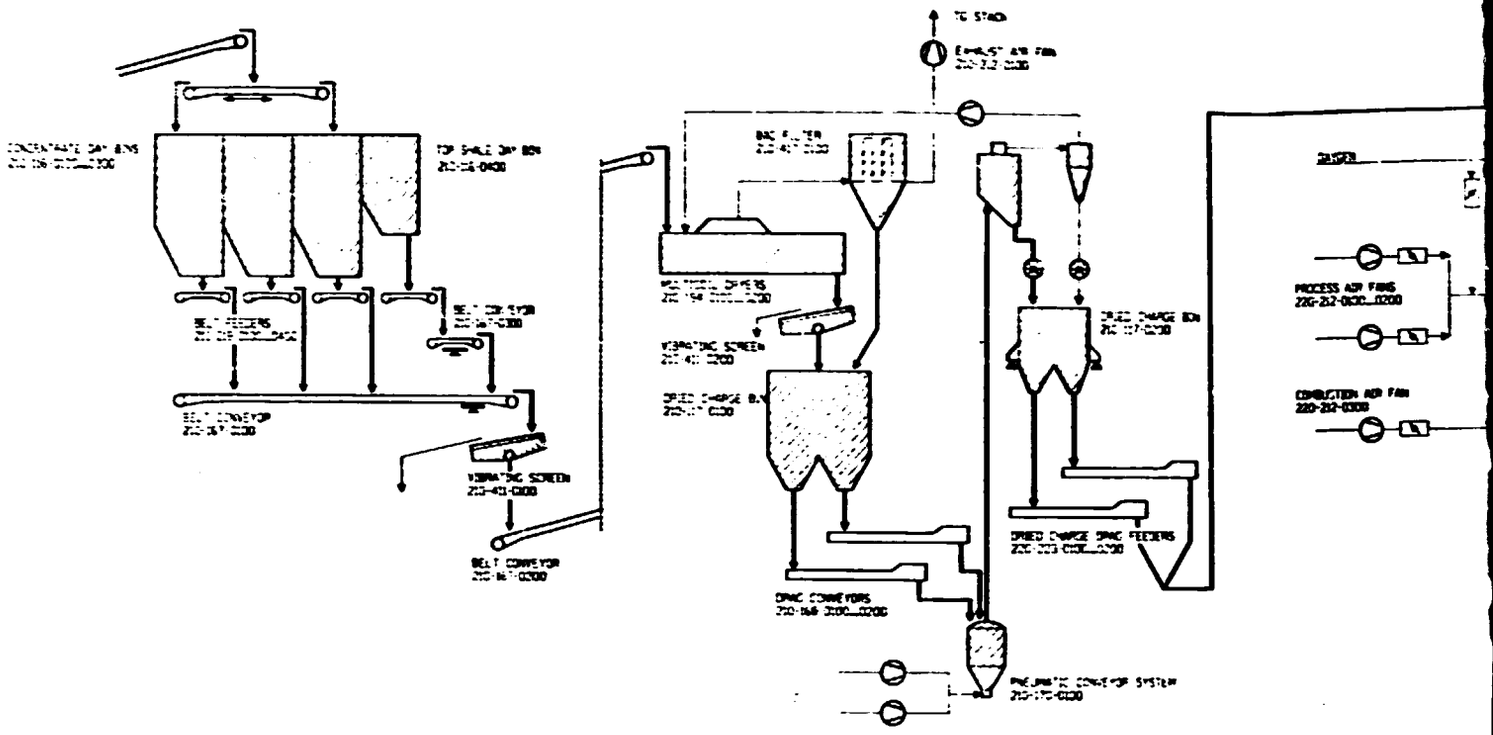
EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW PUMP TANK
VOLUME	15 M3
MATERIAL	ACID PROOF STEEL

330-521-0100

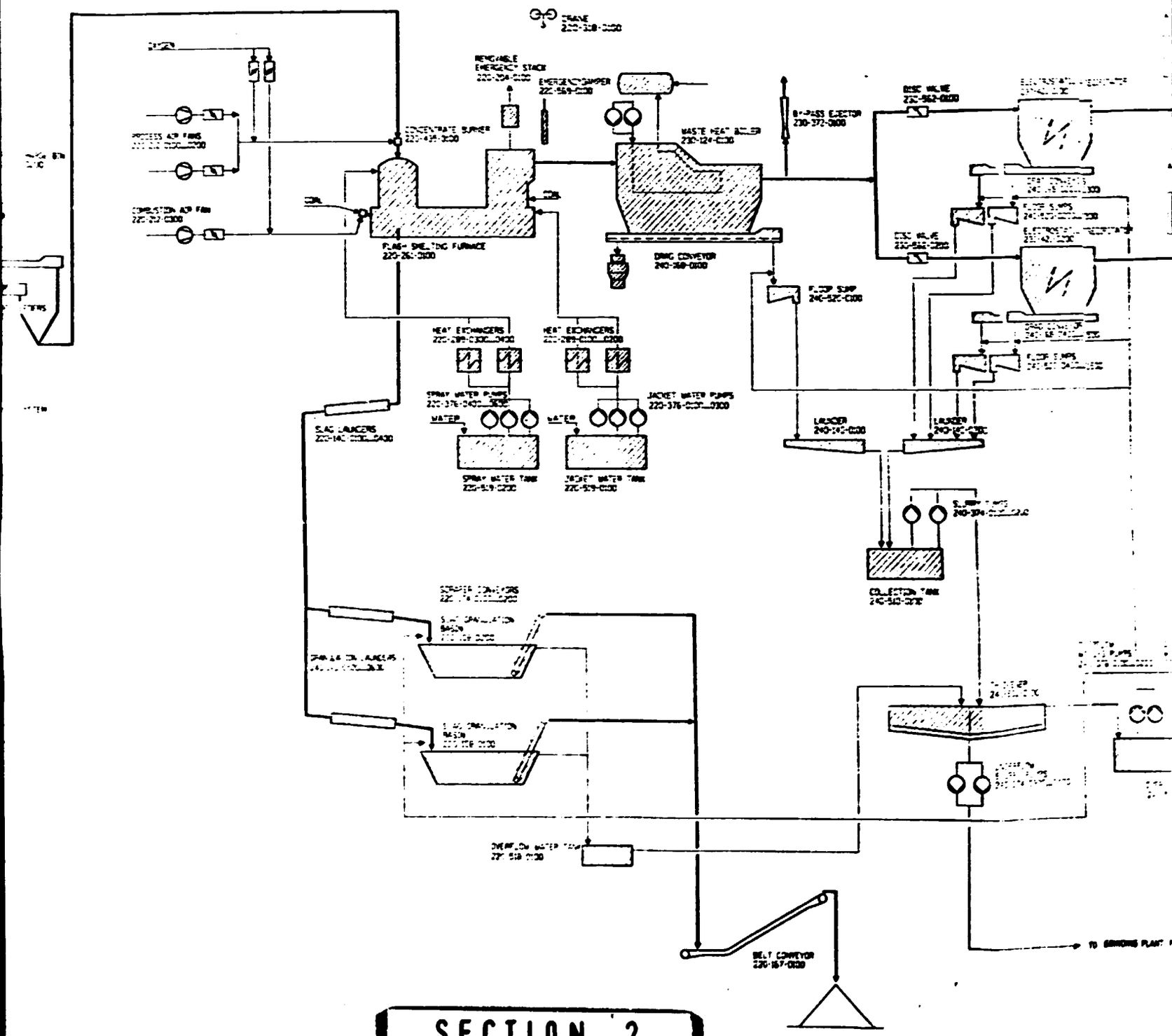
EQUIPMENT TYPE	REACTOR TANK
VOLUME	3 M3
MATERIAL	STEEL BRICKLINING AND RUBBERIZED

330-532-0100

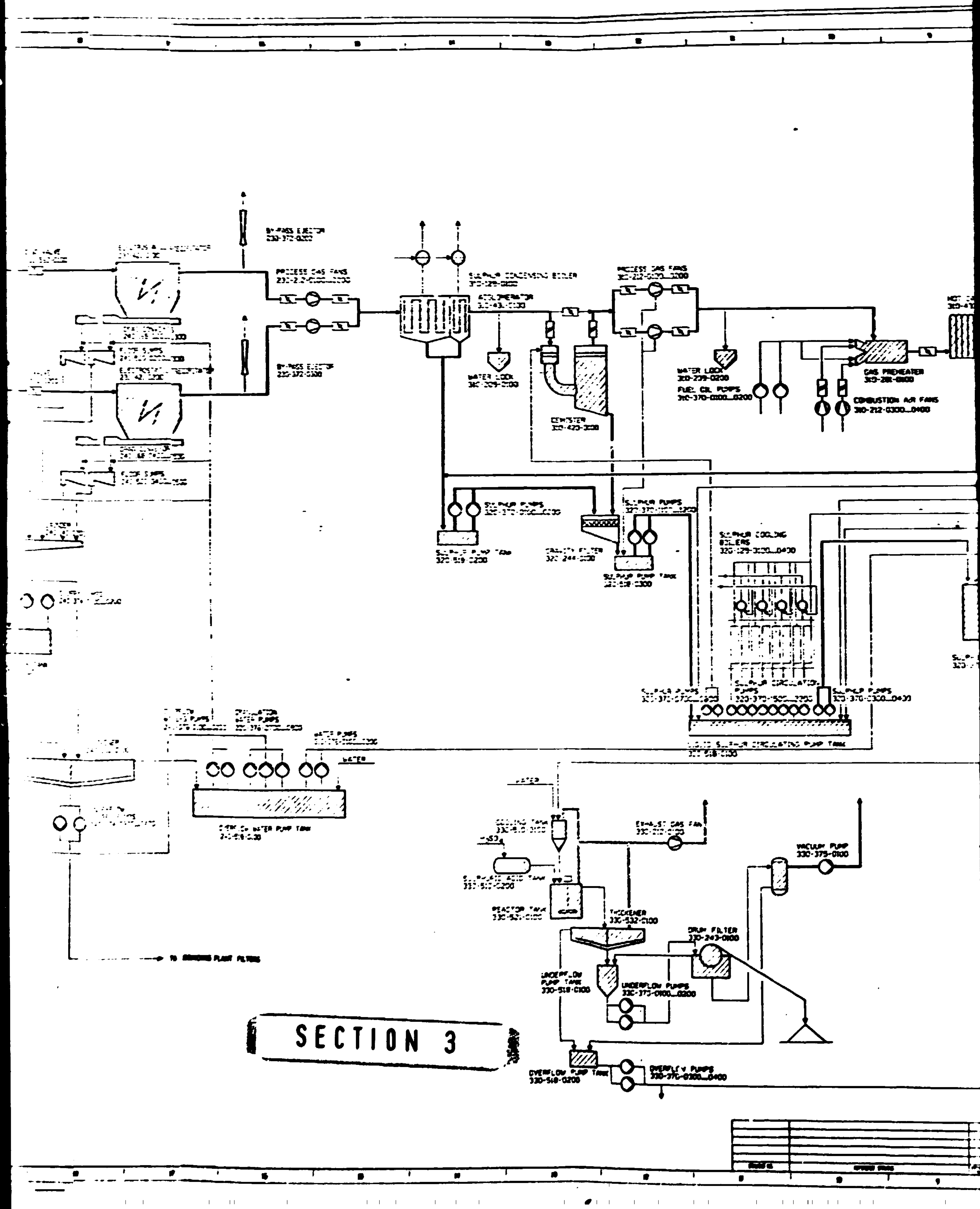
EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 3500 MM


TO STACK
EXHAUST AIR FAN
BAG FILTER
PROCESS AIR FANS
COMBUSTION AIR FAN
VIBRATING SCREEN
BELT CONVEYOR
PNEUMATIC CONVEYOR SYSTEM

SECTION 1


CRANE
RETRACTABLE EMERGENCY STACK
EMERGENCY DAMPER
PROCESS AIR FANS
CONCENTRATE BURNER
COMBUSTION AIR FAN
COAL
FLASH SMELTING FURNACE
WASTE HEAT BOILER
BY-PASS EJECTOR
DISC VALVE
DISC VALVE
DRAG CONVEYOR
FLUX SILO
HEAT EXCHANGERS
HEAT EXCHANGERS
SPRAY WATER PUMPS
JACKET WATER PUMPS
WATER
WATER
SLAG LADLES
SPRAY WATER TANK
JACKET WATER TANK
LADLER
LADLER
COLLECTION TANK
SCRAPER CONVEYORS
SLAG GRANULATION BASIN
SLAG GRANULATION BASIN
GRANULATION LADLES
OVERFLOW WATER TANK
BELT CONVEYOR
TO SMELTING PLANT

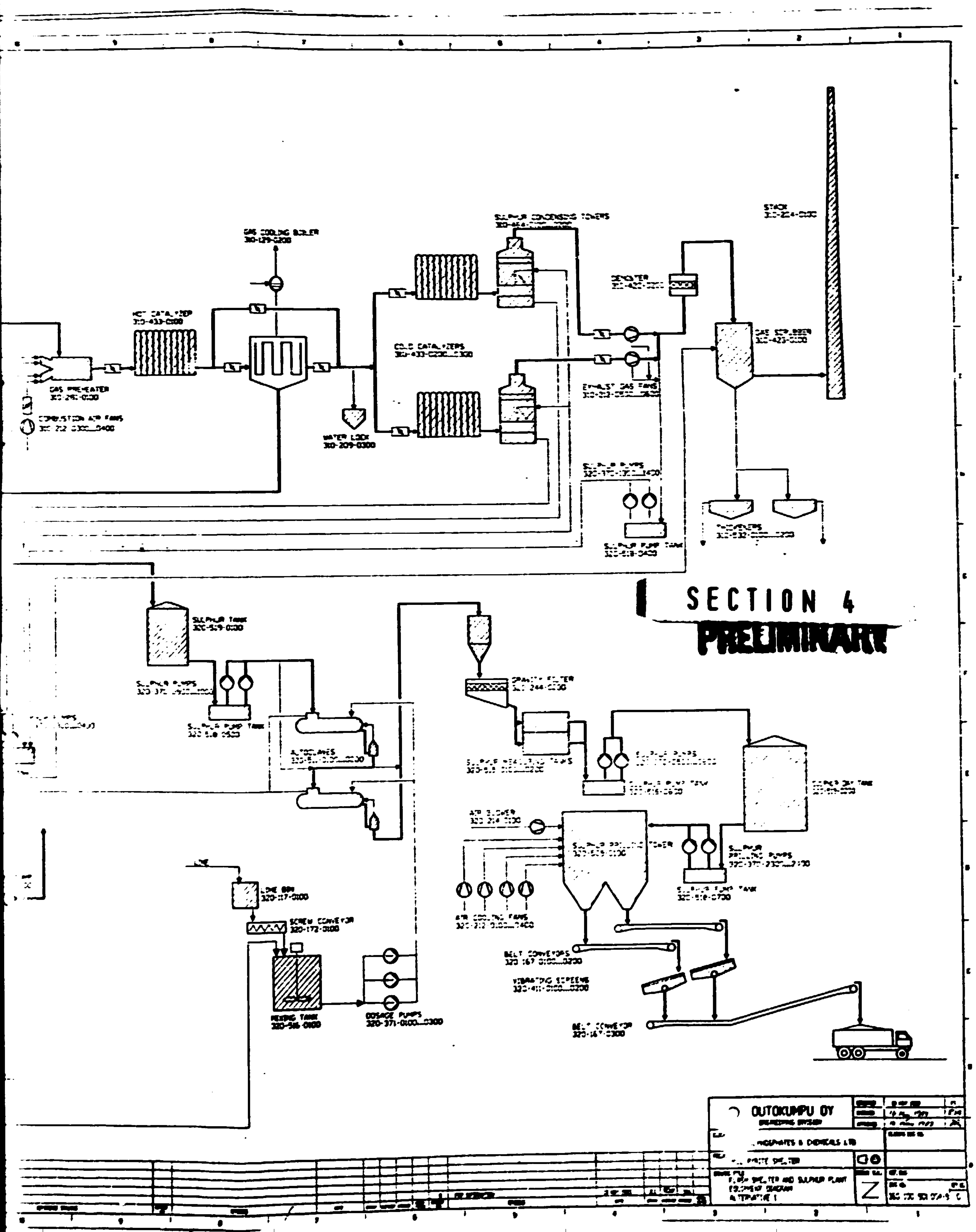
SECTION 2



PROCESS GAS FANS
SULPHUR CONDENSING BOILER
AGGLOMERATOR
WATER LOCK
320-239-0200
FUEL OIL PUMPS
320-370-0100...0200
GAS PREHEATER
320-281-0100
COMBUSTION AIR FANS
320-212-0300...0400
SULPHUR PUMPS
GRAVITY FILTER
SULPHUR PUMP TANK
SULPHUR COOLING BOILERS
SULPHUR CIRCULATION PUMPS
WATER
EXHAUST GAS FAN
VACUUM PUMP
330-375-0100
REACTOR TANK
THICKENER
330-532-0100
DRUM FILTER
330-243-0100
UNDERFLOW PUMP TANK
330-518-0100
UNDERFLOW PUMPS
330-375-0100...0200
OVERFLOW PUMP TANK
330-518-0200
OVERFLOW PUMPS
330-370-0300...0400
SECTION 3

SECTION 4

PRELIMINARY



OUTOKUMPU OY
ENGINEERING DIVISION

4.2.2
List of equipment

Smelter and sulphur plant
Alternative 2

Equipment diagram, drawing No. 360 100 901 005-9

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

210-116-0100

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-0200

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-0300

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-117-0100

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 300 M3
MATERIAL	STEEL

210-117-0200

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 50 M3
MATERIAL	STEEL

210-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	120 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 1000 MM

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN : VS

CLIENT NO :
REVISION : C DATE :09.05.83

210-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	120 T/H
MAIN DIMENSIONS	LENGTH 105000 MM
	WIDTH 1000 MM

210-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	70 T/H
MAIN DIMENSIONS	LENGTH 18000 MM
	WIDTH 800 MM

210-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	70 T/H
MAIN DIMENSIONS	LENGTH 16000 MM
	WIDTH 800 MM

210-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
SERVICE	FOR DRIED CHARGE
CAPACITY	150 T/H

210-194-0100

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	60 T/H

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS
CLIENT NO :
REVISION :0 DATE :09.05.83

210-194-0200

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	60 T/H

210-212-0100

EQUIPMENT TYPE	EXHAUST AIR FAN
SERVICE	EXHAUST AIR FAN FOR BAG FILTER
CAPACITY	30000 NM3/H

210-218-0100

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	20-100 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-218-0200

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	20-100 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-218-0300

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	20-100 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	120 T/H

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

210-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	120 T/H

210-417-0100

EQUIPMENT TYPE	BAG FILTER
CAPACITY	30000 NM3/h

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

220-108-0100

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR MATTE
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-108-0200

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR MATTE AND SLAG
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-108-0300

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR SLAG
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-131-0100

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0200

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS
CLIENT NO :
REVISION :0 DATE :09.05.83

220-131-0300

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0400

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0500

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0600

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-132-0100

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL

220-132-0200

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

220-140-0100

EQUIPMENT TYPE	MATTE LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0200

EQUIPMENT TYPE	MATTE LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0300

EQUIPMENT TYPE	MATTE LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0400

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0500

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0600

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-0700

EQUIPMENT TYPE	GRANLLATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-140-0800

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-140-0900

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR MATTE
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 100000 MM
	WIDTH 650 MM

220-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR MATTE AND SLAG
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 14000 MM
	WIDTH 650 MM

220-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR SLAG
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 80000 MM
	WIDTH 650 MM

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

220-167-0400

EQUIPMENT TYPE	BELT CONVEYOR
TYPE	BELT CONVEYOR WITH TRIPPER
SERVICE	FOR MATTE
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 35000 MM
	WIDTH 650 MM

220-174-0100

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR MATTE
CAPACITY	60 T/H

220-174-0200

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR MATTE AND SLAG
CAPACITY	60 T/H

220-174-0300

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR SLAG
CAPACITY	60 T/H

220-204-0100

EQUIPMENT TYPE	REMOVABLE EMERGENCY STACK FOR FSF

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

220-212-0100

EQUIPMENT TYPE	PROCESS AIR FAN
CAPACITY	25000 NM3/H
PRESSURE	12 KPA
TEMPERATURE	35 C

220-212-0200

EQUIPMENT TYPE	PROCESS AIR FAN
CAPACITY	25000 NM3/H
PRESSURE	12 KPA
TEMPERATURE	35 C

220-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
CAPACITY	20000 NM3/H
PRESSURE	9 KPA
TEMPERATURE	35 C

220-223-0100

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	6-60 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 800 MM

220-223-0200

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	6-60 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 800 MM

220-261-0100

EQUIPMENT TYPE	FLASH SMELTING FURNACE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

220-281-0100

EQUIPMENT TYPE	PREHEATER
TYPE	STEAM PREHEATER
SERVICE	PROCESS AIR PREHEATER
CAPACITY	AIR 25000 NM3/H OXYGEN 18000 NM3/H
TEMPERATURE RANGE	25-200 C

220-289-0100

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
CAPACITY	700 M3/h

220-289-0200

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	700 M3/h

220-289-0300

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
CAPACITY	300 M3/h

220-289-0400

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	300 M3/H

220-318-0100

EQUIPMENT TYPE	OVERHEAD TRAVELING CRANE
LIFTING CAPACITY	10 T

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

220-376-0100

EQUIPMENT TYPE	JACKET WATER PUMP
CAPACITY	700 M3/h
PRESSURE	650 KPA

220-376-0200

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	STAND BY
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0300

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	EMERGENCY
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0400

EQUIPMENT TYPE	SPRAY WATER PUMP
CAPACITY	300 M3/H
PRESSURE	600 KPA

220-376-0500

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	STAND BY
CAPACITY	300 M3/H
PRESSURE	600 KPA

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

220-376-0600

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	EMERGENCY
CAPACITY	300 M3/H
PRESSURE	600 KPA

220-376-0700

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-376-0800

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-376-0900

EQUIPMENT TYPE	GRANULATION WATER PUMP
SERVICE	STAND BY
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-435-0100

EQUIPMENT TYPE	CONCENTRATE BURNER

220-518-0100

EQUIPMENT TYPE	WATER TANK
SERVICE	OVERFLOW WATER TANK
VOLUME	20 M3
MATERIAL	CONCRETE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

220-519-J100

EQUIPMENT TYPE	JACKET WATER TANK
VOLUME	400 M3
MATERIAL	CONCRETE

220-519-0200

EQUIPMENT TYPE	SPRAY WATER TANK
VOLUME	300 M3
MATERIAL	CONCRETE

220-569-0100

EQUIPMENT TYPE	EMERGENCY DAMPER BETWEEN FSF-WHB

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

230-124-0100

EQUIPMENT TYPE	WASTE HEAT BOILER
CAPACITY	SATURATED STEAM 150 T/H
PRESSURE	70 BAR
GAS FLOW	145000 NM3/H
TEMPERATURE	INLET 1250 C
	OUTLET 350 C

230-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	72000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C

230-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	72000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C

230-372-0100

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-PASS EJECTOR BETWEEN WHB AND EP.

230-372-0200

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.

230-372-0300

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

230-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP
CAPACITY	1200 M3/H
HEAD	40 M

230-376-0200

EQUIPMENT TYPE	WATER PUMP
TYPE	TURBINE DRIVE WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP FOR EMERGENCY
CAPACITY	1200 M3/H
HEAD	40 M

230-421-0100

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	72000 NM3/H
TEMPERATURE	360 C

230-421-0200

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	72000 NM3/H
TEMPERATURE	300 C

230-562-0100

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO : 340 100 900 002 ALT2
DESIGN : VS

CLIENT NO :
REVISION : 0 DATE : 09.05.83

230-562-0200

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :C DATE :09.05.83

240-140-0100

EQUIPMENT TYPE	LAUNDER
TYPE	
SERVICE	FOR WHB DUST
DIMENSIONS	LENGTH 4000 MM

240-140-0200

EQUIPMENT TYPE	LAUNDER
TYPE	
SERVICE	FOR EP DUST
DIMENSIONS	LENGTH 25000 MM

240-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR FOR WHB DUST
CAPACITY	15 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 800 MM

240-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-168-0300

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

CLIENT :PPGL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS
CLIENT NO :
REVISION :0 DATE :09.05.83

240-168-0400

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-168-0500

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-374-0100

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR COLLECTION TANK
CAPACITY	130 M3/H

240-374-0200

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR COLLECTION TANK
CAPACITY	130 M3/H

240-374-0300

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :326 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

240-374-0400

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H

240-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW
CAPACITY	130 M3/H

240-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW
CAPACITY	130 M3/H

240-510-0100

EQUIPMENT TYPE	COLLECTION TANK
SERVICE	FOR WHB AND EP DUST
VOLUME	10 M3
MATERIAL	CONCRETE

240-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW WATER PUMP TANK
VOLUME	500 M3
MATERIAL	CONCRETE

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

240-520-0100

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR WHB DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0200

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0300

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0400

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

240-520-0500

EQUIPMENT TYPE	FLOOR SUMP
SERVICE	PULPING SUMP FOR EP DUST
VOLUME	1 M3
MATERIAL	STAINLESS STEEL

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

240-532-J100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 30000 MM
MATERIAL	CONCRETE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

310-129-0100

EQUIPMENT TYPE	SULPHUR CONDENSING BOILER
CAPACITY	SATURATED STEAM 20 T/H (HIGH) SATURATED STEAM 8 T/H (LOW)
PRESSURE	5,5 BAR 1,7 BAR
GAS FLOW	145000 NM3/H
TEMPERATURE	INLET 360 C OUTLET 150 C

310-129-0200

EQUIPMENT TYPE	GAS COOLING BOILER
CAPACITY	SATURATED STEAM 28 T/H
PRESSURE	5,5 BAR
GAS FLOW	130000 NM3/H
TEMPERATURE	INLET 480 C OUTLET 200 C

310-204-0100

EQUIPMENT TYPE	STACK
SERVICE	FOR SULPHUR LINE AND POWER PLANT
HEIGHT	150 M

310-209-0100

EQUIPMENT TYPE	WATER LOCK

310-209-0200

EQUIPMENT TYPE	WATER LOCK

310-209-0300

EQUIPMENT TYPE	WATER LOCK

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

310-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN	
CAPACITY	72000	NM3/H
PRESSURE	4	KPA
TEMPERATURE	170	C

310-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN	
CAPACITY	72000	NM3/H
PRESSURE	4	KPA
TEMPERATURE	170	C

310-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN	
SERVICE	FOR GAS REHEATER	
CAPACITY	20000	NM3/H
PRESSURE	17	KPA
TEMPERATURE	35	C

310-212-0400

EQUIPMENT TYPE	COMBUSTION AIR FAN	
CAPACITY	20000	NM3/H
PRESSURE	17	KPA
TEMPERATURE	35	C

310-212-0500

EQUIPMENT TYPE	FAN	
SERVICE	EXHAUST GAS FAN	
CAPACITY	80000	NM3/H
PRESSURE	2,5	KPA
TEMPERATURE	140	C

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 10C 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

310-212-J60G

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	80000 NM3/H
PRESSURE	2,5 KPA
TEMPERATURE	140 C

310-281-J100

EQUIPMENT TYPE	GAS REHEATER
SERVICE	FOR PROCESS GAS
CAPACITY	GAS INLET 140000 NM3/H OUTLET 160000 NM3/H
TEMPERATURE	INLET/OUTLET 150/435 C

310-370-0100

EQUIPMENT TYPE	FUEL OIL PUMP
TYPE	
SERVICE	FOR GAS REHEATER
CAPACITY	2 M3/H

310-370-0200

EQUIPMENT TYPE	FUEL OIL PUMP
SERVICE	FOR GAS REHEATER
CAPACITY	2 M3/H

310-376-J100

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	300 M3/H
PRESSURE	600 KPA

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

310-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	300 M3/H
PRESSURE	600 KPA

310-420-0100

EQUIPMENT TYPE	DEMISTER
CAPACITY	145000 NM3/H
TEMPERATURE	150 C

310-420-0200

EQUIPMENT TYPE	DEMISTER
CAPACITY	160000 NM3/H
TEMPERATURE	135 C

310-423-0100

EQUIPMENT TYPE	SCRUBBER
SERVICE	FOR PROCESS GAS
CAPACITY	160000 NM3/H
GAS TEMPERATURE	INLET 135 C
	OUTLET 50 C

310-431-0100

EQUIPMENT TYPE	AGGLOMERATOR
CAPACITY	145 000 NM3/H
TEMPERATURE	150 C

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

310-433-0100

EQUIPMENT TYPE	HOT CATALYZER
CAPACITY	150000 NM3/H
TEMPERATURE	420 C
MATERIAL	STAINLESS STEEL

310-433-0200

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	80000 NM3/H
TEMPERATURE	260 C
MATERIAL	STEEL

310-433-0300

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	80000 NM3/H
TEMPERATURE	260 C
MATERIAL	STEEL

310-464-0100

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
GAS FLOW	80000 NM3/H
TEMPERATURE	INLET 260 C OUTLET 135 C

310-464-0200

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
GAS FLOW	80000 NM3/H
TEMPERATURE	INLET 260 C OUTLET 135 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

310-532-0100

EQUIPMENT TYPE	THICKENER
SERVICE	FOR SCRUBBER
DIMENSIONS	DIAMETER 11000 MM
MATERIAL	WOOD

310-532-0200

EQUIPMENT TYPE	THICKENER
SERVICE	FOR SCRUBBER
DIMENSIONS	DIAMETER 11000 MM
MATERIAL	WOOD

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-117-0100

EQUIPMENT TYPE	BIN
SERVICE	LIME BIN
VOLUME	5 M3
MATERIAL	STEEL

320-129-0100

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0200

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0300

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0400

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 650 MM

320-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 650 MM

320-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING SULPHUR
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 80000 MM
	WIDTH 650 MM

320-172-0100

EQUIPMENT TYPE	SCREW CONVEYOR
SERVICE	FOR LIME
CAPACITY	0-200 KG/H

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-212-0100

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0200

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0300

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0400

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-214-0100

EQUIPMENT TYPE	AIR BLOWER
SERVICE	FOR PRILLING TOWER
CAPACITY	2000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C

320-244-0100

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR

320-244-0200

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR

320-370-0100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0500

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0600

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0700

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

320-370-0800

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-0900

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-1000

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-1100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	50 M3/H
HEAD	25 M

320-370-1200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	50 M3/H
HEAD	25 M

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-370-1300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	5 M3/H
HEAD	25 M

320-370-1400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	5 M3/H
HEAD	25 M

320-370-1500

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1600

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1700

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

320-370-1800

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1900

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2000

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :C DATE :09.05.83

320-370-2300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA

320-370-2400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA

320-371-0100

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

320-371-0200

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

320-371-0300

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK STAND BY
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

320-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	150 T/H

320-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	150 T/H

320-509-0100

EQUIPMENT TYPE	PRILLING TOWER
SERVICE	SULPHUR PRILLING TOWER
DIMENSIONS	DIAMETER 30000 MM, HEIGHT 40000 MM WALL THICKNESS 350 MM
MATERIAL	CONCRETE

320-511-0100

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 29 T/H
VOLUME	25 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)

320-511-0200

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 29 T/H
VOLUME	25 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)

320-515-0100

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	6 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-515-0200

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	6 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-516-0100

EQUIPMENT TYPE	MIXING TANK
SERVICE	FOR LIME MILK
VOLUME	25 M3
MATERIAL	STEEL

320-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	LIQUID SULPHUR CIRCULATING TANK
VOLUME	110 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

320-518-0200

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	16 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0300

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0400

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	10 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0500

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS
CLIENT NO :
REVISION :0 DATE :09.05.83

320-518-0600

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0700

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-519-0100

EQUIPMENT TYPE	TANK
SERVICE	SULPHUR TANK
VOLUME	100 M3
MATERIAL	STEEL STEAM HEATING PIPES

320-519-0200

EQUIPMENT TYPE	DAY TANK
SERVICE	SULPHUR DAY TANK
VOLUME	400 M3
MATERIAL	STEEL STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

330-212-0100

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	5000 NM3/H
PRESSURE	500 PA

330-243-0100

EQUIPMENT TYPE	DRUM FILTER
FILTER AREA	4,5 M2

330-370-0100

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP
CAPACITY	2 M3/H
HEAD	15 M

330-370-0200

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP
CAPACITY	2 M3/H
HEAD	15 M

330-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP
CAPACITY	15 M3/H
HEAD	20 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO : 360 100 900 002 ALT2
DESIGN : VS

CLIENT NO :
REVISION : 0 DATE : 09.05.83

330-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP
CAPACITY	15 M3/H
HEAD	20 M

330-375-0100

EQUIPMENT TYPE	VACUUM PUMP
CAPACITY	4,5 M3/MIN
VACUUM	UNDER PRESSURE 600 MM HG

330-510-0100

EQUIPMENT TYPE	TANK
SERVICE	COOLING TANK
VOLUME	5 M3
MATERIAL	ACID PROOF STEEL

330-510-0200

EQUIPMENT TYPE	TANK
SERVICE	SULPHURIC ACID TANK
VOLUME	3 M3
MATERIAL	STEEL

330-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	UNDERFLOW PUMP TANK
VOLUME	5 M3
MATERIAL	ACID PROOF STEEL

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :C DATE :09.05.83

330-518-0200

EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW PUMP TANK
VOLUME	15 M3
MATERIAL	ACID PROOF STEEL

330-521-0100

EQUIPMENT TYPE	REACTOR TANK
VOLUME	3 M3
MATERIAL	STEEL BRICKLINING AND RUBBERIZED

330-532-0100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 3500 MM

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 103 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :05.05.83

410-117-0100

EQUIPMENT TYPE	BIN
SERVICE	FSF-MATTE FEED BIN
VOLUME	(TOTAL) 250 M3
MATERIAL	STEEL

410-117-0200

EQUIPMENT TYPE	BIN
SERVICE	FSF-MATTE FEED BIN
VOLUME	(TOTAL) 250 M3
MATERIAL	STEEL

410-117-0300

EQUIPMENT TYPE	BIN
SERVICE	COAL FEED BIN
VOLUME	(TOTAL) 50 M3
MATERIAL	STEEL

410-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	200 T/H
MAIN DIMENSIONS	LENGTH 10000 MM
BELT WIDTH	800 MM

410-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
TYPE	SHUTTLE BELT CONVEYOR
CAPACITY	200 T/H
MAIN DIMENSIONS	LENGTH 8000 MM
BELT WIDTH	800 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

410-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	40 T/H
MAIN DIMENSIONS	LENGTH 13000 MM
BELT WIDTH	650 MM

410-202-0100

EQUIPMENT TYPE	HOPPER
SERVICE	FEED HOPPER
VOLUME	10 M3
MATERIAL	STEEL

410-218-0100

EQUIPMENT TYPE	BELT FEEDER
SERVICE	BELT FEEDER FOR FSF-MATTE
CAPACITY	10-40 T/H
BELT LENGTH	7000 MM
BELT WIDTH	800 MM

410-218-0200

EQUIPMENT TYPE	BELT FEEDER
SERVICE	BELT FEEDER FOR FSF-MATTE
CAPACITY	10-40 T/H
BELT LENGTH	7000 MM
BELT WIDTH	800 MM

410-218-0300

EQUIPMENT TYPE	BELT FEEDER
SERVICE	BELT FEEDER FOR COAL
CAPACITY	0,5-5 T/H
BELT LENGTH	10000 MM
BELT WIDTH	650 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2
DESIGN :VS

CLIENT NO :
REVISION :0 DATE :09.05.83

420-106-0100	
EQUIPMENT TYPE	BASIN
SERVICE	WET COOLER BASIN
DIMENSIONS	L X W X H : 10 X 2 X 2 M
MATERIAL	STEEL (BASALT LINING)
420-117-0100	
EQUIPMENT TYPE	BIN
SERVICE	BED MATERIAL FEED BIN
VOLUME	20 M3
MATERIAL	STEEL
420-167-0100	
EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR CALCINE
CAPACITY	50 T/H
MAIN DIMENSIONS	LENGTH 120000 MM
BELT WIDTH	800 MM
420-174-0100	
EQUIPMENT TYPE	SCRAPER CONVEYOR
SERVICE	SCRAPER DEWATERING CONVEYOR
CAPACITY	50 T/H
420-212-0100	
EQUIPMENT TYPE	AIR FAN
SERVICE	ROASTING AIR FAN
CAPACITY	60000 NM3/H
PRESSURE	25 KPA

420-214-0100

EQUIPMENT TYPE	AIR BLOWER
SERVICE	FOR EJECTOR
CAPACITY	35 M3/MIN.
PRESSURE	700 KPA

420-214-0200

EQUIPMENT TYPE	AIR BLOWER
SERVICE	FOR EJECTOR
CAPACITY	35 M3/MIN.
PRESSURE	700 KPA

420-216-0100

EQUIPMENT TYPE	AIR LOCK FEEDER
CAPACITY	20 T/H

420-216-0200

EQUIPMENT TYPE	AIR LOCK FEEDER
CAPACITY	20 T/H
CONSTRUCTION	WATER COOLED

420-216-0300

EQUIPMENT TYPE	AIR LOCK FEEDER
CAPACITY	20 T/H
CONSTRUCTION	WATER COOLED

420-262-0100

EQUIPMENT TYPE	ROASTING FURNACE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 002 ALT2 CLIENT NO :
DESIGN :VS REVISION :0 DATE :09.05.83

420-372-0100

EQUIPMENT TYPE	EJECTOR

420-372-0200

EQUIPMENT TYPE	EJECTOR

420-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR WET COOLER
CAPACITY	350 M3/H
HEAD	30 M

420-376-0200

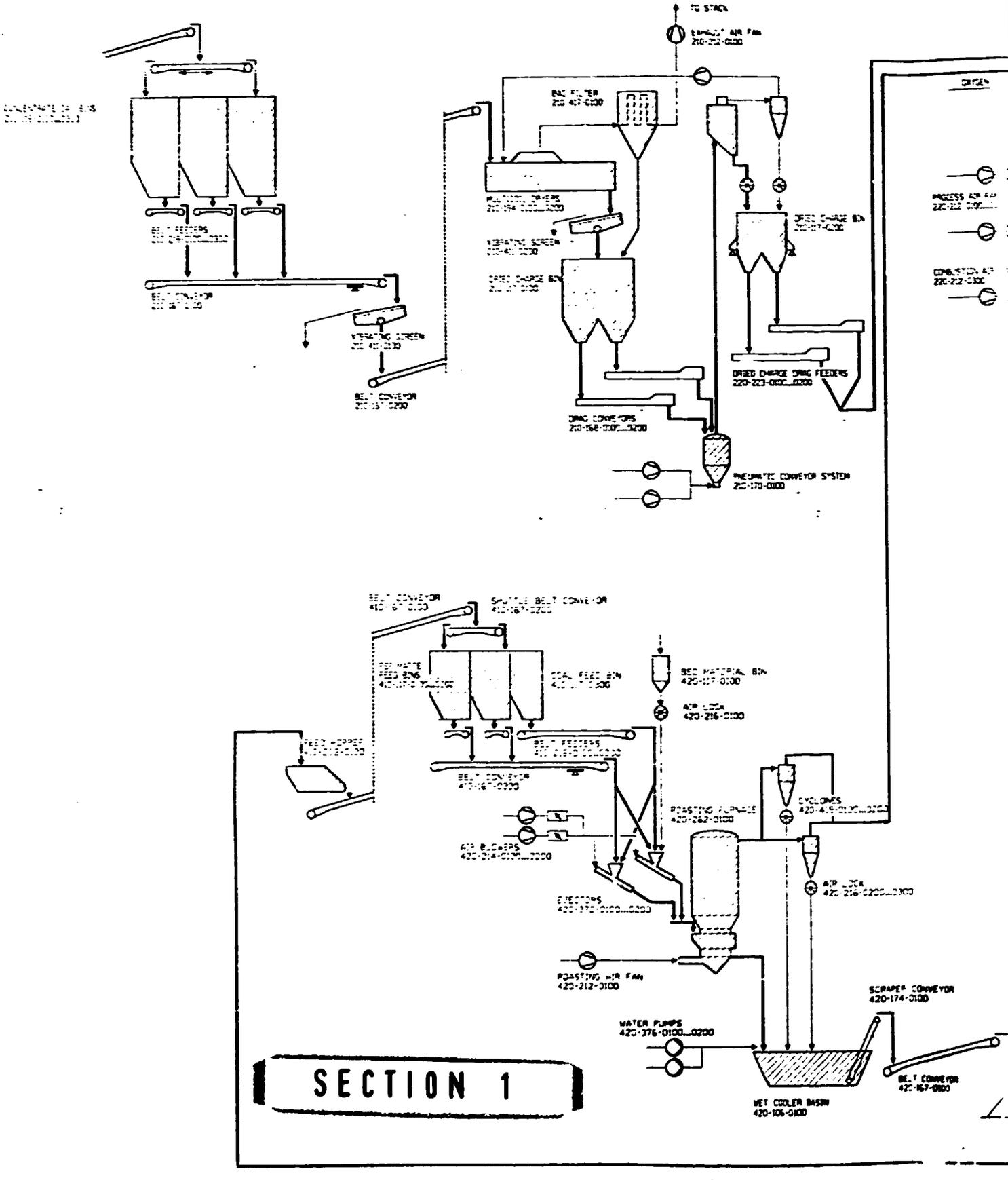
EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR WET COOLER
CAPACITY	350 M3/H
HEAD	30 M

420-419-0100

EQUIPMENT TYPE	CYCLONE
CAPACITY	30000 NM3/H
TEMPERATURE	1000 C
MATERIAL	STEEL , BRICK LINING

420-419-0200

EQUIPMENT TYPE	CYCLONE
CAPACITY	30000 NM3/H
TEMPERATURE	1000 C
MATERIAL	STEEL , BRICK LINING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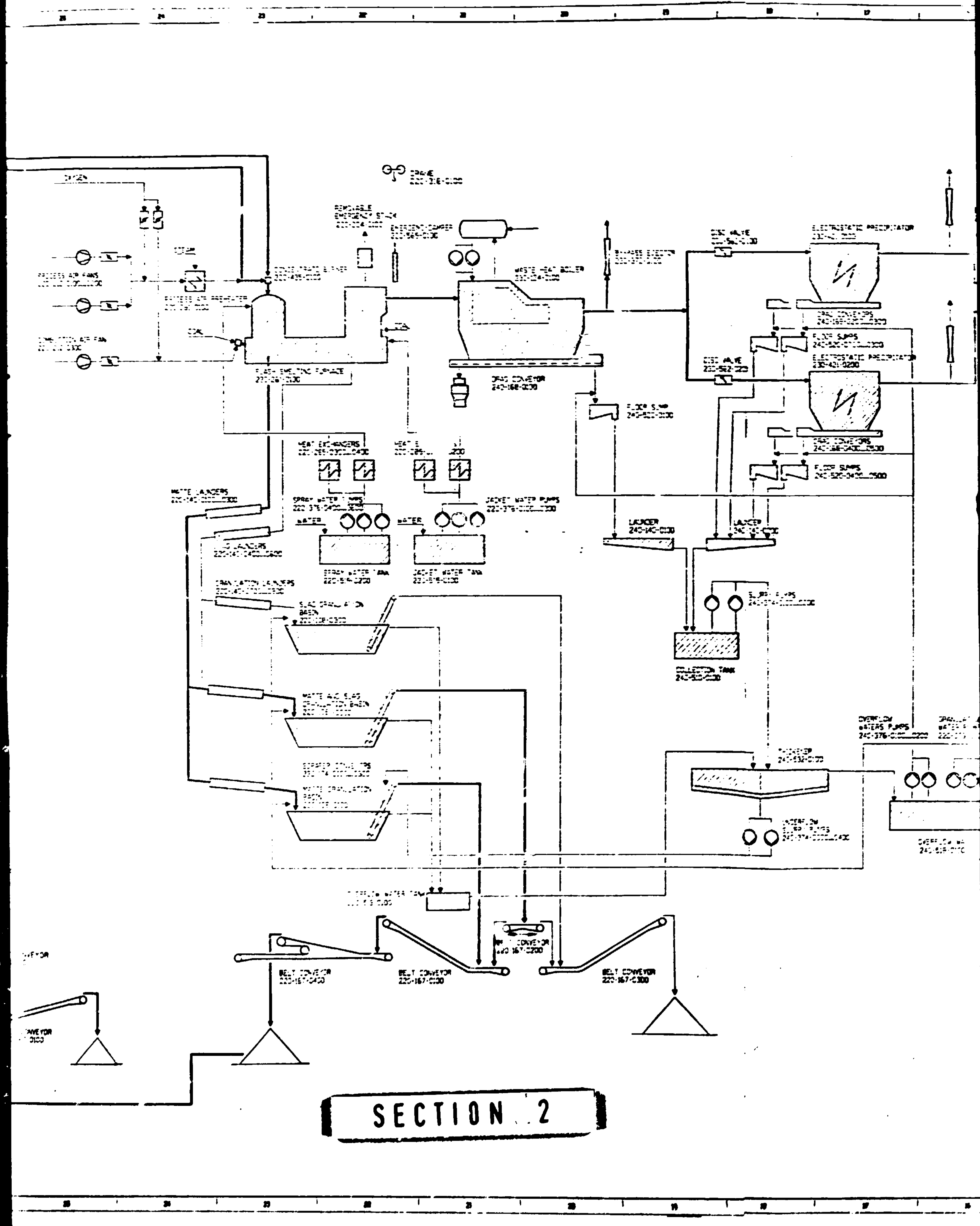
BAG FILTER
VIBRATING SCREEN
DRIED CHARGE BIN
DRIED CHARGE DRAG FEEDERS
DRAG CONVEYORS
PNEUMATIC CONVEYOR SYSTEM
BELT CONVEYOR
SHUTTLE BELT CONVEYOR
FEED MATERIAL BIN
COAL FEED BIN
AIR LOCK
FEED HOPPER
ROASTING FURNACE
CYCLONES
AIR BLOWERS
EJECTORS
ROASTING AIR FAN
SCRAPER CONVEYOR
WATER PUMPS
WET COOLER BASIN
SECTION 1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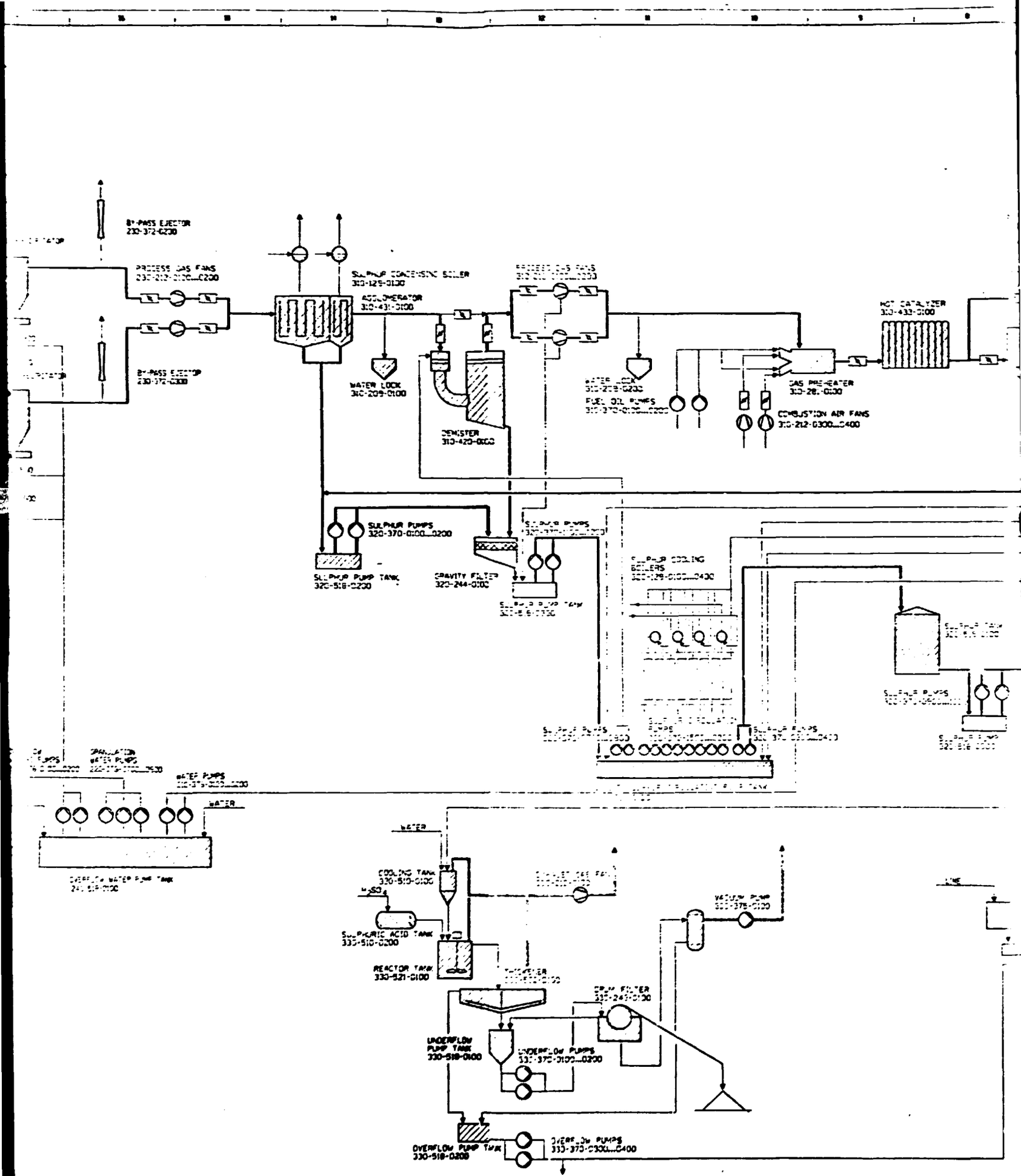
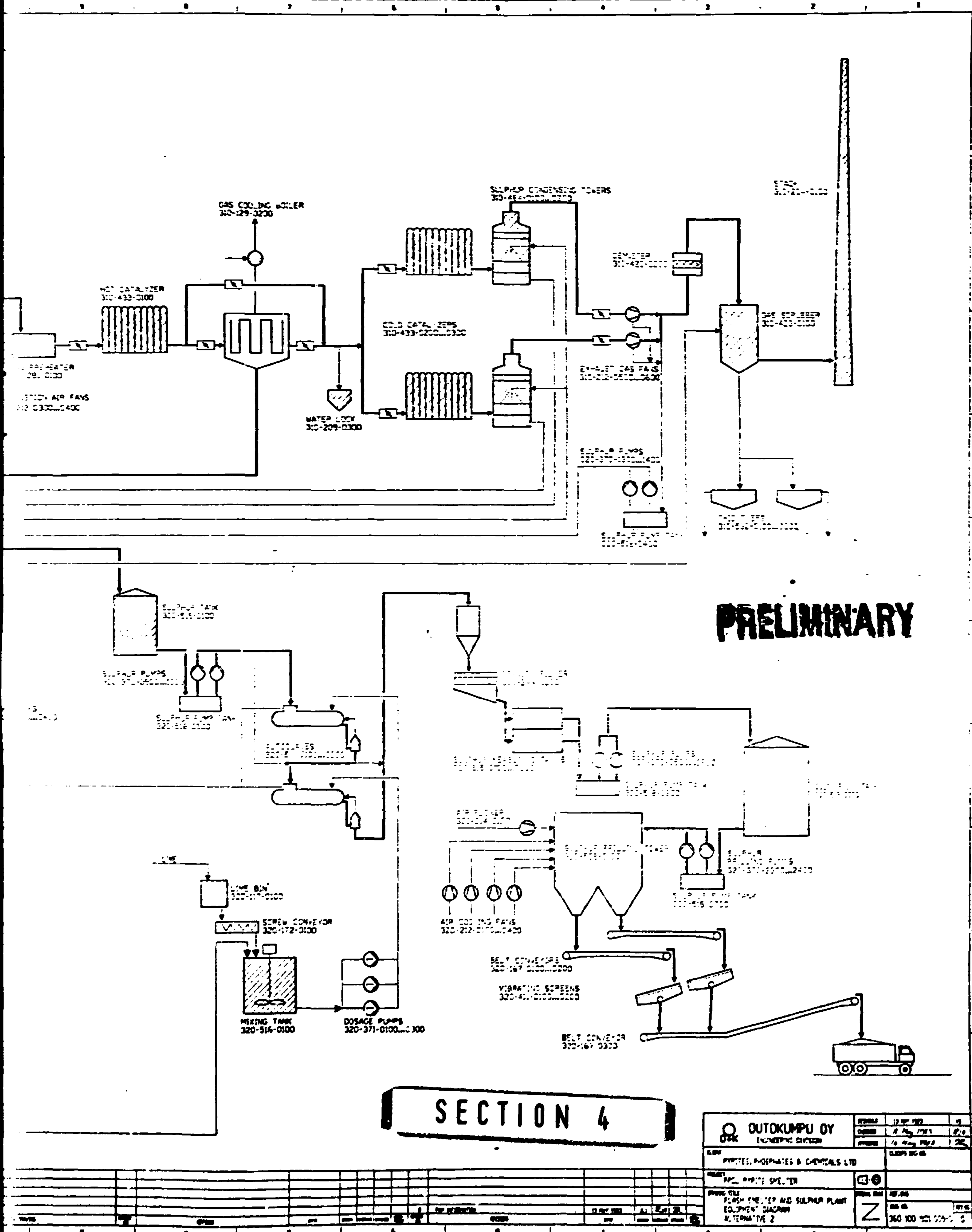
WASTE HEAT BOILER
DRAG CONVEYOR
FLASH SMELTING FURNACE
HEAT EXCHANGERS
JACKET WATER PUMPS
SPRAY WATER TANK
JACKET WATER TANK
MATTE LAUNDERS
GRANULATION LAUNDERS
LAUNDER
SLURRY PUMPS
COLLECTION TANK
THICKENER
UNDERFLOW SLURRY PUMPS
OVERFLOW WATERS PUMPS
BELT CONVEYOR
SECTION 2


BY-PASS EJECTOR
330-372-0230
PROCESS GAS FANS
330-212-0100...0200
SULPHUR CONDENSING BOILER
330-129-0130
AGGLOMERATOR
330-431-0100
BY-PASS EJECTOR
330-372-0330
WATER LOCK
330-209-0100
DEMISTER
330-420-0000
WATER LOCK
330-209-0230
FUEL OIL PUMPS
GAS PREHEATER
330-281-0100
COMBUSTION AIR FANS
330-212-0300...0400
HOT CATALYZER
330-433-0100
SULPHUR PUMPS
320-370-0100...0200
SULPHUR PUMP TANK
320-518-0200
GRAVITY FILTER
320-244-0100
SULPHUR COOLING
BOILERS
320-129-0100...0430
WATER PUMPS
WATER
OVERFLOW WATER PUMP TANK
COOLING TANK
330-510-0100
SULPHURIC ACID TANK
330-510-0200
REACTOR TANK
330-521-0100
VACUUM PUMP
330-375-0100
UNDERFLOW
PUMP TANK
330-518-0100
UNDERFLOW PUMPS
330-370-0100...0200
OVERFLOW PUMP TANK
330-518-0200
OVERFLOW PUMPS
330-370-0300...0400

SECTION 3


GAS COOLING BOILER
310-129-0200
HOT CATALYZER
310-433-0100
COLD CATALYZERS
310-433-0200...0300
WATER LOCK
310-209-0300
SULPHUR CONDENSING TOWERS
DEMISTER
GAS SCRUBBER
STACK
EXHAUST GAS FANS
SULPHUR PUMPS
SULPHUR PUMP TANK
SULPHUR TANK
PRELIMINARY
AIR BLOWER
AIR COOLING FANS
320-212-0100...0400
BELT CONVEYORS
320-167-0100...0200
VIBRATING SCREENS
BELT CONVEYOR
320-167-0300
LIME
LIME BIN
SCREW CONVEYOR
320-172-0100
MIXING TANK
320-516-0100
DOSAGE PUMPS
320-371-0100...0300
SECTION 4
OUTOKUMPU OY
ENGINEERING DIVISION
PYRITES, PHOSPHATES & CHEMICALS LTD
PPCL PYRITE SMELTER
FLASH SMELTER AND SULPHUR PLANT
EQUIPMENT DIAGRAM
ALTERNATIVE 2

OUTOKUMPU OY
ENGINEERING DIVISION

4.2.3
List of equipment

Smelter and sulphur plant
Alternative 3

Equipment diagram, drawing No. 360 100 901 007-9

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :C DATE :17.11.83

210-116-J100

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-J200

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-116-J300

EQUIPMENT TYPE	CONCENTRATE DAY BIN
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE

210-117-J100

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 300 M3
MATERIAL	STEEL

210-117-J200

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 50 M3
MATERIAL	STEEL

210-167-J100

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	140 T/H
MAIN DIMENSIONS	LENGTH 50000 MM
	WIDTH 1000 MM

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 G03 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

210-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	140 T/H
MAIN DIMENSIONS	LENGTH 105000 MM
	WIDTH 1000 MM

210-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	80 T/H
MAIN DIMENSIONS	LENGTH 18000 MM
	WIDTH 800 MM

210-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	80 T/H
MAIN DIMENSIONS	LENGTH 18000 MM
	WIDTH 800 MM

210-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
SERVICE	FOR DRIED CHARGE
CAPACITY	150 T/H

210-194-0100

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	60 T/H

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA
CLIENT NO :
REVISION :0 DATE :17.11.83

210-194-0200

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	60 T/H

210-212-0100

EQUIPMENT TYPE	EXHAUST AIR FAN
SERVICE	EXHAUST AIR FAN FOR BAG FILTER
CAPACITY	30000 NM3/H

210-218-0100

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-218-0200

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-218-0300

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	9000 MM
BELT WIDTH	1200 MM

210-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	140 T/H

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

210-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	140 T/H

210-417-0100

EQUIPMENT TYPE	BAG FILTER
CAPACITY	30000 NM3/H

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

220-108-0100

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR MATTE
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-108-0200

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR MATTE AND SLAG
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-108-0300

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR SLAG
DIMENSIONS	L X b X H : 18 X 8 X 6 M
MATERIAL	CONCRETE

220-131-0100

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0200

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

220-131-0300

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0400

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0500

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-131-0600

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H

220-132-0100

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL

220-132-0200

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

220-140-J100

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-J200

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-J300

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-J400

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000 MM

220-140-J500

EQUIPMENT TYPE	MATTE LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000MM

220-140-J600

EQUIPMENT TYPE	MATTE LAUNDER WITH COVERS
DIMENSIONS	LENGTH 10000MM

220-140-J700

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :C DATE :17.11.83

220-140-J800

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-140-0900

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM

220-167-J100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR MATTE
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 100000 MM
	WIDTH 650 MM

220-167-J200

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR MATTE AND SLAG
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 14000 MM
	WIDTH 650 MM

220-167-J300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR SLAG
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 80000 MM
	WIDTH 650 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

220-167-0400

EQUIPMENT TYPE	BELT CONVEYOR
TYPE	BELT CONVEYOR WITH TRIPPER
SERVICE	FOR MATTE
CAPACITY	60 T/H
MAIN DIMENSIONS	LENGTH 35000 MM
	WIDTH 650 MM

220-174-0100

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR MATTE
CAPACITY	60 T/H

220-174-0200

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR MATTE AND SLAG
CAPACITY	60 T/H

220-174-0300

EQUIPMENT TYPE	SCRAPER CONVEYOR
TYPE	SCRAPER DEWATERING CONVEYOR
SERVICE	FOR SLAG
CAPACITY	60 T/H

220-204-0100

EQUIPMENT TYPE	REMOVABLE EMERGENCY STACK FOR FSF

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :R.A

CLIENT NO :
REVISION :0 DATE :17.11.83

220-212-0100

EQUIPMENT TYPE	PROCESS AIR FAN
CAPACITY	45000 NM3/H
PRESSURE	12 KPA
TEMPERATURE	35 C

220-212-0200

EQUIPMENT TYPE	PROCESS AIR FAN
CAPACITY	45000 NM3/H
PRESSURE	12 KPA
TEMPERATURE	35 C

220-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
CAPACITY	20000 NM3/H
PRESSURE	9 KPA
TEMPERATURE	35 C

220-223-0100

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	6-60 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 800 MM

220-223-0200

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	6-60 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 800 MM

220-261-0100

EQUIPMENT TYPE	FLASH SMELTING FURNACE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

220-281-0100

EQUIPMENT TYPE	PREHEATER
TYPE	STEAM PREHEATER
SERVICE	FOR PROCESS AIR
CAPACITY	AIR 8000C M3/H NTP OXYGEN 1000C M3/H NTP

220-289-0100

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
CAPACITY	700 M3/H

220-289-0200

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	700 M3/H

220-289-0300

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
CAPACITY	300 M3/H

220-289-0400

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	300 M3/H

220-318-0100

EQUIPMENT TYPE	OVERHEAD TRAVELING CRANE
LIFTING CAPACITY	10 T

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

220-376-0100

EQUIPMENT TYPE	JACKET WATER PUMP
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0200

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	STAND BY
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0300

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	EMERGENCY
CAPACITY	700 M3/H
PRESSURE	650 KPA

220-376-0400

EQUIPMENT TYPE	SPRAY WATER PUMP
CAPACITY	300 M3/H
PRESSURE	600 KPA

220-376-0500

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	STAND BY
CAPACITY	300 M3/H
PRESSURE	600 KPA

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

220-376-0600

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	EMERGENCY
CAPACITY	300 M3/H
PRESSURE	600 KPA

220-376-0700

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-376-0800

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-376-0900

EQUIPMENT TYPE	GRANULATION WATER PUMP
SERVICE	STAND BY
CAPACITY	600 M3/H
PRESSURE	350 KPA

220-435-0100

EQUIPMENT TYPE	CONCENTRATE BURNER

220-518-0100

EQUIPMENT TYPE	WATER TANK
SERVICE	OVERFLOW WATER TANK
VOLUME	20 M3
MATERIAL	CONCRETE

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

220-519-0100

EQUIPMENT TYPE	JACKET WATER TANK
VOLUME	400 M3
MATERIAL	CONCRETE

220-519-0200

EQUIPMENT TYPE	SPRAY WATER TANK
VOLUME	300 M3
MATERIAL	CONCRETE

220-569-0100

EQUIPMENT TYPE	EMERGENCY DAMPER BETWEEN FSF-WHB

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

230-124-0100

EQUIPMENT TYPE	WASTE HEAT BOILER
CAPACITY	SATURATED STEAM 130 T/H
PRESSURE	70 BAR
GAS FLOW	125000 NM3/H
TEMPERATURE	INLET 1250 C
	OUTLET 350 C

230-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	67000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C

230-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	67000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C

230-372-0100

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-PASS EJECTOR BETWEEN WHB AND EP.

230-372-0200

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.

230-372-0300

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :C DATE :17.11.83

230-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP
CAPACITY	1100 M3/H
HEAD	40 M

230-376-0200

EQUIPMENT TYPE	WATER PUMP
TYPE	TURBINE DRIVE WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP FOR EMERGENCY
CAPACITY	1100 M3/H
HEAD	40 M

230-421-0100

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	67000 NM3/H
TEMPERATURE	360 C

230-421-0200

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	67000 NM3/H
TEMPERATURE	360 C

230-562-0100

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

230-562-0200

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

240-140-0100

EQUIPMENT TYPE	LAUNDER
TYPE SERVICE	FOR WHB DUST
DIMENSIONS	LENGTH 4000 MM

240-140-0200

EQUIPMENT TYPE	LAUNDER
TYPE SERVICE	FOR EP DUST
DIMENSIONS	LENGTH 25000 MM

240-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR FOR WHB DUST
CAPACITY	15 T/H
MAIN DIMENSIONS	LENGTH 40000 MM WIDTH 800 MM

240-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM WIDTH 500 MM

240-168-0300

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM WIDTH 500 MM

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

240-168-0400

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/h
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-168-0500

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM

240-197-0100

EQUIPMENT TYPE	CHUTE
TYPE	WITH WATER NOZZLES AND WATER LOCK
SERVICE	FOR WASTE HEAT BOILER DUST

240-197-0200

EQUIPMENT TYPE	CHUTE
TYPE	WITH WATER NOZZLES AND WATER LOCK
SERVICE	FOR PRECIPITATOR DUST

240-197-0300

EQUIPMENT TYPE	CHUTE
TYPE	WITH WATER NOZZLES AND WATER LOCK
SERVICE	FOR PRECIPITATOR DUST

240-197-0400

EQUIPMENT TYPE	CHUTE
TYPE	WITH WATER NOZZLES AND WATER LOCK
SERVICE	FOR PRECIPITATOR DUST

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

240-197-0500

EQUIPMENT TYPE	CHUTE
TYPE	WITH WATER NOZZLES AND WATER LOCK
SERVICE	FOR PRECIPITATOR DUST

240-374-0100

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR COLLECTION TANK
CAPACITY	130 M3/H

240-374-0200

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR COLLECTION TANK
CAPACITY	130 M3/H

240-374-0300

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H

240-374-0400

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

240-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW
CAPACITY	130 M3/H

240-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW
CAPACITY	130 M3/H

240-510-0100

EQUIPMENT TYPE	COLLECTION TANK
SERVICE	FOR WHB AND EP DUST
VOLUME	10 M3
MATERIAL	CONCRETE

240-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW WATER PUMP TANK
VOLUME	500 M3
MATERIAL	CONCRETE

240-532-0100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 30000 MM
MATERIAL	CONCRETE

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

310-129-0100

EQUIPMENT TYPE	SULPHUR CONDENSING BOILER	
CAPACITY	SATURATED STEAM	18 T/H (HIGH)
	SATURATED STEAM	8 T/H (LOW)
PRESSURE	5,5	BAR
	1,7	BAR
GAS FLOW	125000	NM3/H
TEMPERATURE	INLET 360	C
	OUTLET 150	C

310-129-0200

EQUIPMENT TYPE	GAS COOLING BOILER	
CAPACITY	SATURATED STEAM	25 T/H
PRESSURE	5,5	BAR
GAS FLOW	110000	NM3/H
TEMPERATURE	INLET 480	C
	OUTLET 200	C

310-204-0100

EQUIPMENT TYPE	STACK
SERVICE	FOR SULPHUR LINE AND POWER PLANT
HEIGHT	150 M

310-209-0100

EQUIPMENT TYPE	WATER LOCK

310-209-0200

EQUIPMENT TYPE	WATER LOCK

310-209-0300

EQUIPMENT TYPE	WATER LOCK

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

310-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	67000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	170 C

310-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	67000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	170 C

310-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
SERVICE	FOR GAS REHEATER
CAPACITY	18000 NM3/H
PRESSURE	17 KPA
TEMPERATURE	35 C

310-212-0400

EQUIPMENT TYPE	COMBUSTION AIR FAN
CAPACITY	18000 NM3/H
PRESSURE	17 KPA
TEMPERATURE	35 C

310-212-0500

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	75000 NM3/H
PRESSURE	2,5 KPA
TEMPERATURE	140 C

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO
REVISION .0 DATE :17.11.83

310-212-J60C	
EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	75000 NM3/H
PRESSURE	2,5 KPA
TEMPERATURE	140 C
310-281-0100	
EQUIPMENT TYPE	GAS REHEATER
SERVICE	FOR PROCESS GAS
CAPACITY	GAS INLET 125000 NM3/H OUTLET 143000 NM3/H
TEMPERATURE	INLET/OUTLET 150/435 C
310-370-0100	
EQUIPMENT TYPE	FUEL OIL PUMP
TYPE	
SERVICE	FOR GAS REHEATER
CAPACITY	1.7 M3/H
310-370-0200	
EQUIPMENT TYPE	FUEL OIL PUMP
SERVICE	FOR GAS REHEATER
CAPACITY	1.7 M3/H
310-376-J10C	
EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	300 M3/H
PRESSURE	60C KPA

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

310-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	300 M3/H
PRESSURE	600 KPA

310-420-0100

EQUIPMENT TYPE	DEMISTER
CAPACITY	125000 NM3/H
TEMPERATURE	150 C

310-420-0200

EQUIPMENT TYPE	DEMISTER
CAPACITY	143000 NM3/H
TEMPERATURE	135 C

310-423-0100

EQUIPMENT TYPE	SCRUBBER
SERVICE	FOR PROCESS GAS
CAPACITY	143000 NM3/H
GAS TEMPERATURE	INLET 135 C
	OUTLET 50 C

310-431-0100

EQUIPMENT TYPE	AGGLOMERATOR
CAPACITY	125000 NM3/H
TEMPERATURE	150 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

310-433-0100

EQUIPMENT TYPE	HOT CATALYZER
CAPACITY	140000 NM3/H
TEMPERATURE	480 C
MATERIAL	STAINLESS STEEL

310-433-0200

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	75000 NM3/H
TEMPERATURE	260 C
MATERIAL	STEEL

310-433-0300

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	75000 NM3/H
TEMPERATURE	260 C
MATERIAL	STEEL

310-464-0100

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
GAS FLOW	75000 NM3/H
TEMPERATURE	INLET 260 C
	OUTLET 135 C

310-464-0200

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
GAS FLOW	75000 NM3/H
TEMPERATURE	INLET 260 C
	OUTLET 135 C

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

310-532-0100

EQUIPMENT TYPE	THICKENER
SERVICE	FCR SCRUBBER
DIMENSIONS	DIAMETER 11000 MM
MATERIAL	4CGD

310-532-0200

EQUIPMENT TYPE	THICKENER
SERVICE	FCR SCRUBBER
DIMENSIONS	DIAMETER 11000 MM
MATERIAL	4CGD

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3 CLIENT NO :
DESIGN :RJA REVISION :0 DATE :17.11.83

320-117-0100

EQUIPMENT TYPE	BIN
SERVICE	LIME BIN
VOLUME	5 M3
MATERIAL	STEEL

320-129-0100

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0200

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-129-0300

EQUIPMENT TYPE	SULPHUR COOLING BOILER
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR

320-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 650 MM

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO : 360 100 900 003 ALT3
DESIGN : RJA

CLIENT NO :
REVISION : 0 DATE : 17.11.83

320-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 650 MM

320-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLED SULPHUR
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 80000 MM
	WIDTH 650 MM

320-172-0100

EQUIPMENT TYPE	SCREW CONVEYOR
SERVICE	FOR LIME
CAPACITY	0-200 KG/H

320-212-0100

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA
CLIENT NO :
REVISION :0 DATE :17.11.83

320-212-0200

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0300

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-212-0400

EQUIPMENT TYPE	AIR COOLING FAN
TYPE	AXIAL FAN
SERVICE	FOR PRILLING TOWER
CAPACITY	75000 NM3/H
PRESSURE	350 PA
TEMPERATURE	35 C

320-214-0100

EQUIPMENT TYPE	AIR BLOWER
SERVICE	FOR PRILLING TOWER
CAPACITY	2000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-244-0100

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR

320-244-0200

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR

320-370-0100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0500

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0600

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	25 M

320-370-0700

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-0800

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-370-0900

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-1000

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	25 M3/H
HEAD	35 M

320-370-1100

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	50 M3/H
HEAD	25 M

320-370-1200

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	50 M3/H
HEAD	25 M

320-370-1300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	5 M3/H
HEAD	25 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-370-1400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PUMP
CAPACITY	5 M3/H
HEAD	25 M

320-370-1500

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1600

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1700

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-1800

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA
CLIENT NO :
REVISION :0 DATE :17.11.83

320-370-1900

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2000

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR CIRCULATING PUMP
CAPACITY	240 M3/H
HEAD	40 M

320-370-2300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/h
PRESSURE	1600 KPA

320-370-2400

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA

320-371-0100

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-371-0200

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/h
PRESSURE	400 KPA

320-371-0300

EQUIPMENT TYPE	DOSAGE PUMP
SERVICE	FOR LIME MILK STAND BY
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA

320-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	150 T/H

320-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	150 T/H

320-509-0100

EQUIPMENT TYPE	PRILLING TOWER
SERVICE	SULPHUR PRILLING TOWER
DIMENSIONS	DIAMETER 30000 MM, HEIGHT 40000 MM
MATERIAL	WALL THICKNESS 350 MM CONCRETE

320-511-0100

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 26 T/H
VOLUME	23 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)

320-511-0200

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 26 T/H
VOLUME	23 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)

320-515-0100

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	6 M3
MATERIAL	CONCRETE
	STEAM HEATING PIPES

320-515-0200

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	6 M3
MATERIAL	CONCRETE
	STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT:EQ.LIST(AT)
OUTOKUMPU NO :320 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-516-0100

EQUIPMENT TYPE	MIXING TANK
SERVICE	FOR LIME MILK
VOLUME	25 M3
MATERIAL	STEEL

320-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	LIQUID SULPHUR CIRCULATING TANK
VOLUME	95 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0200

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0300

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

320-518-0400

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	10 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0500

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0600

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-518-0700

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK
VOLUME	18 M3
MATERIAL	CONCRETE STEAM HEATING PIPES

320-519-0100

EQUIPMENT TYPE	TANK
SERVICE	SULPHUR TANK
VOLUME	100 M3
MATERIAL	STEEL
	STEAM HEATING PIPES

320-519-0200

EQUIPMENT TYPE	DAY TANK
SERVICE	SULPHUR DAY TANK
VOLUME	400 M3
MATERIAL	STEEL
	STEAM HEATING PIPES

CLIENT :PPCL
DOCUMENT:EQLIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

330-212-0100

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	5000 NM3/H
PRESSURE	500 PA

330-243-0100

EQUIPMENT TYPE	DRUM FILTER
FILTER AREA	4,5 M2

330-370-0100

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP
CAPACITY	2 M3/H
HEAD	15 M

330-370-0200

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP
CAPACITY	2 M3/H
HEAD	15 M

330-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP
CAPACITY	15 M3/H
HEAD	20 M

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 100 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :0 DATE :17.11.83

330-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP
CAPACITY	15 M3/H
HEAD	20 M

330-375-0100

EQUIPMENT TYPE	VACULM PUMP
CAPACITY	4,5 M3/MIN
VACUUM	UNDER PRESSURE 600 MM H3

330-510-0100

EQUIPMENT TYPE	TANK
SERVICE	COOLING TANK
VOLUME	5 M3
MATERIAL	ACID PROOF STEEL

330-510-0200

EQUIPMENT TYPE	TANK
SERVICE	SULPHURIC ACID TANK
VOLUME	3 M3
MATERIAL	STEEL

330-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	UNDERFLOW PUMP TANK
VOLUME	5 M3
MATERIAL	ACID PROOF STEEL

CLIENT : PPCL
DOCUMENT: EQ.LIST(AT)
OUTOKUMPU NO :360 10C 900 003 ALT3
DESIGN :RJA

CLIENT NO :
REVISION :C DATE :17.11.83

330-518-0200

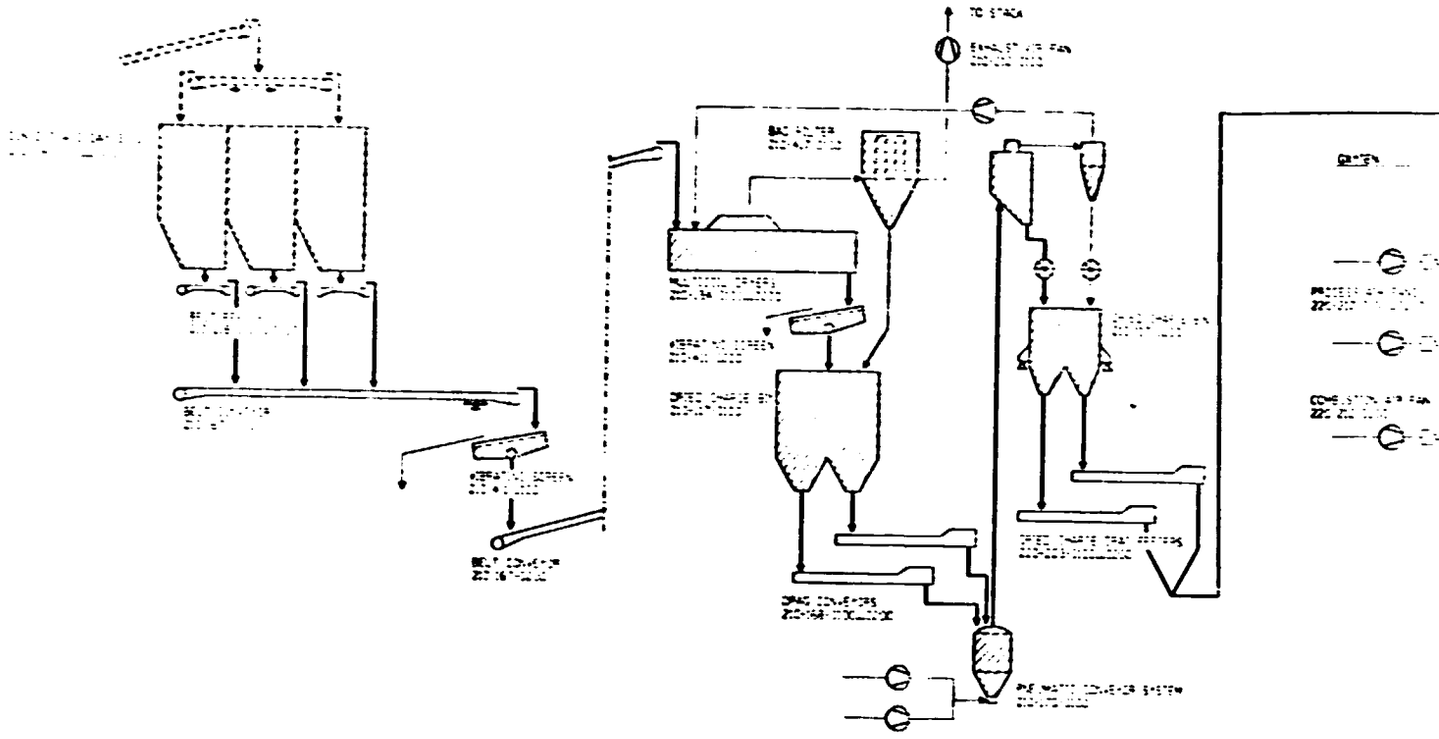
EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW PUMP TANK
VOLUME	15 M3
MATERIAL	ACID PROOF STEEL

330-521-0100

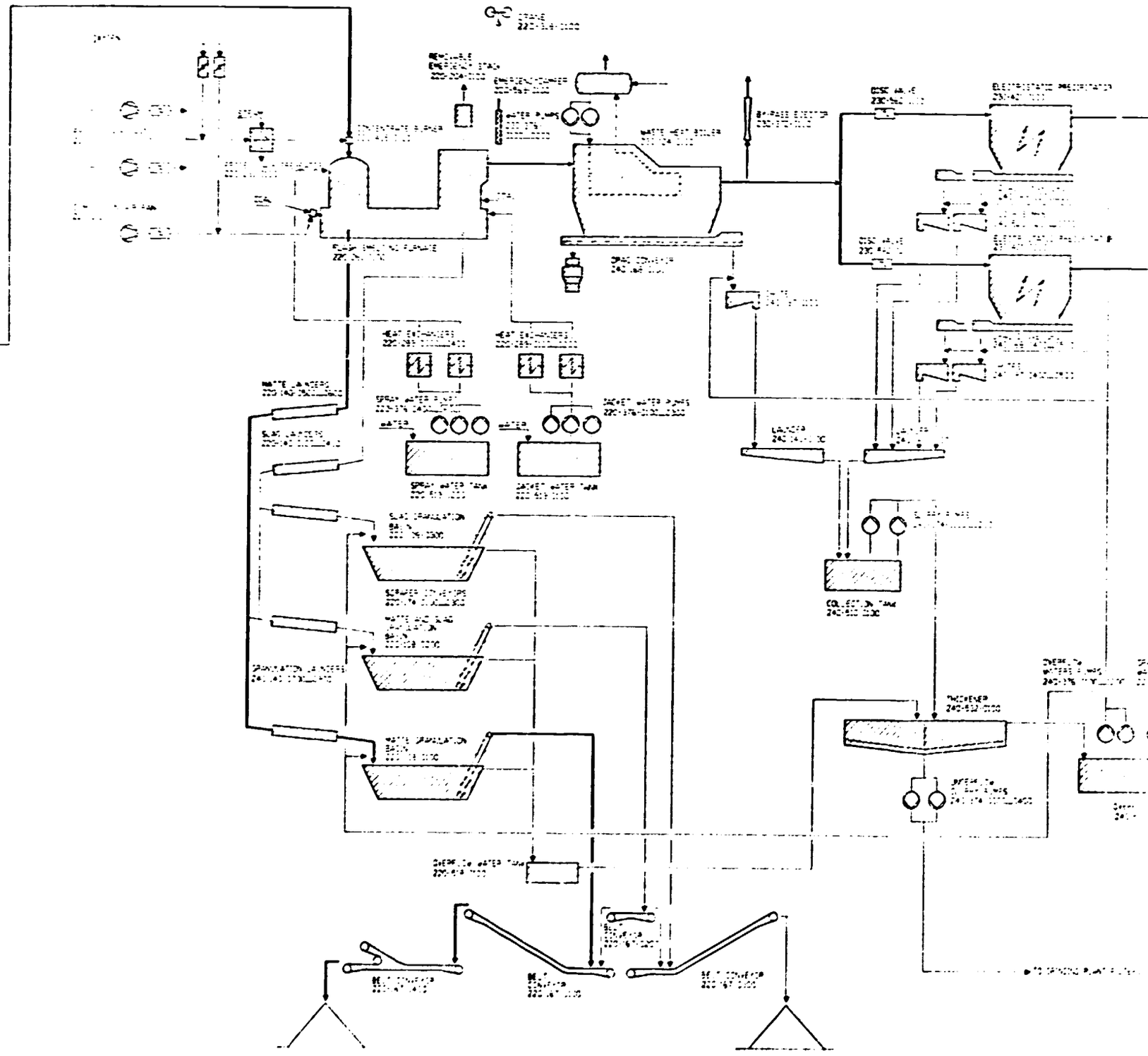
EQUIPMENT TYPE	REACTOR TANK
VOLUME	3 M3
MATERIAL	STEEL BRICKLINING AND RUBBERIZED

330-532-0100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 3500 MM



SECTION 1



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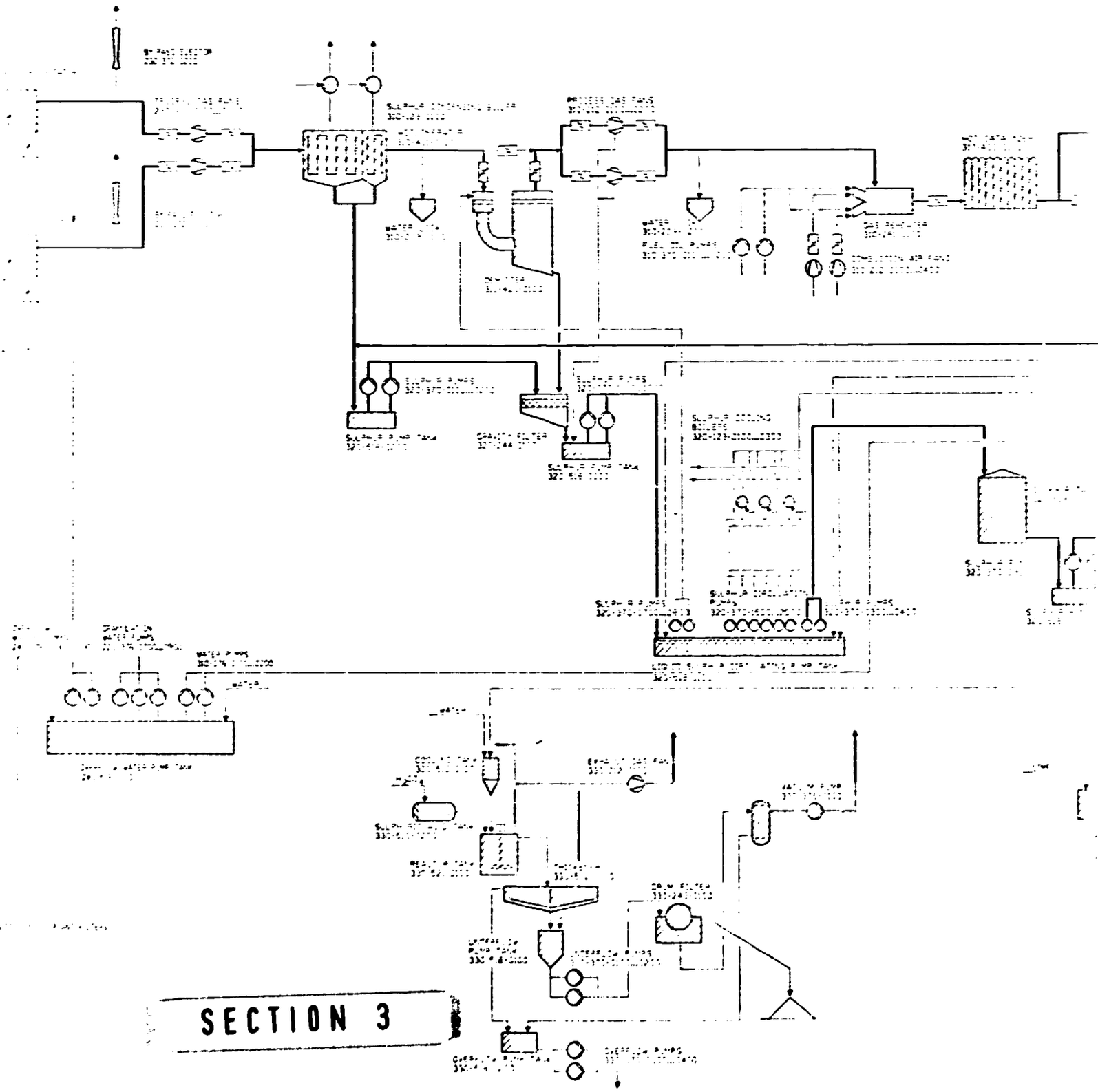
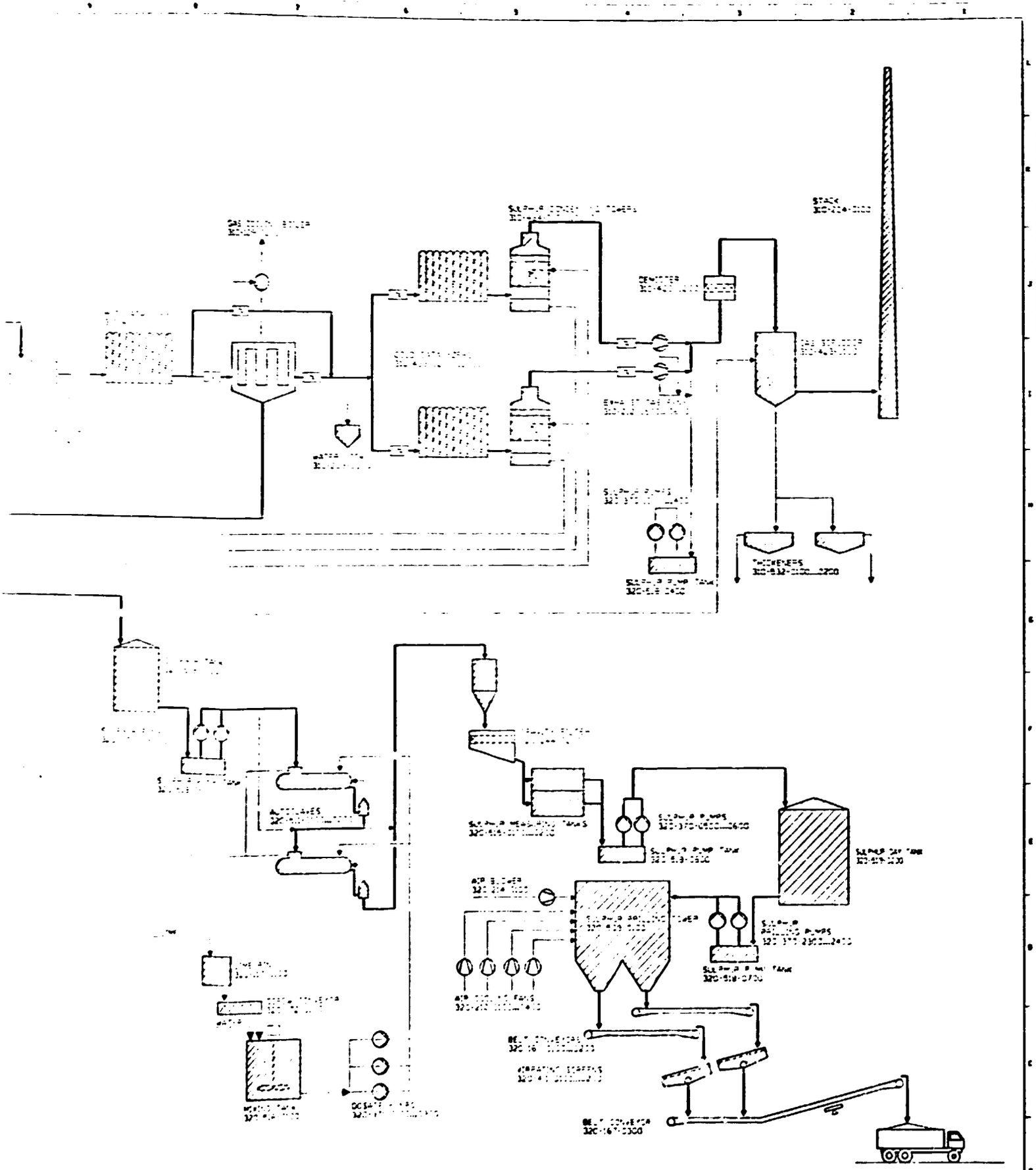


SECTION 3



PRELIMINARY

SECTION 4

OUTOKUMPU OY

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 is 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	170/178*
TOTAL	204/212

5.1.2
General supervision

Technical manager	1
Chief metallurgist	1
Metallurgist	1
TOTAL	3

5.1.3
Smelter and sulphur plant

	Day shift	Shift	TOTAL
Engineers	1		1
General foreman	1		1
Foremen	3	8	11
			13
Operating crew	20	68/76*	88/96*

* In alternative 2 men/shift more will be needed (roaster).

5.1.4
Power plant (including coal and water plants)

	Day shifts	Shift	TOTAL
Engineers	2		2
General foremen	1		1
Foremen	3	4	7
			10
Operating crew	8	44	52

5.1.5
Oxygen plant

	Day shift	Shift	TOTAL
Foreman	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	5
			6
Crew	8	12	20

5.2
Requirement of utilities and consumables (7500 h/a)

5.2.1
Flash smelting and roasting areas

Alternative		1	2	3
Coal	t/a	157 000	147 000	129 000
Electric energy	MWh/a	24 000	23 600	21 000
Steam 20 bar, 300°C	t/a	150 000	124 000	139 000
Steam 70 bar, saturated	t/a	-	44 000	100 000
Process and cooling water	m^3/a	9 380 000	10 500 000	7 880 000
Refractory bricks	t/a	500	400	400

5.2.2
Sulphur plant area

Fuel oil	t/a	12 700	10 900	10 000
Electric energy	MWh/a	13 100	11 700	11 000
Steam 5.5 bar, saturated	t/a	90 000	90 000	90 000
Process and cooling water	m^3/a	2 330 000	2 330 000	2 330 000
Lime	t/a	330	330	330
Sulphuric acid	t/a	400	400	400
Catalyst mass	t/a	1 000	820	800

5.2.3
Power plant area (including coal and water plants)
Operation time 7500+500 h/a

		Alternative	1	2
Coal	t/a	26 000	29 000	22 000
Electric energy	MWh/a	12 500	12 500	11 500
Demin.water	m^3/a	155 000	155 000	155 000
Cooling water (river)	m^3/a	$45 \cdot 10^6$	$45 \cdot 10^6$	$45 \cdot 10^6$
Esp. for water plant:				
Raw water	m^3/a	475 000	475 000	475 000
NaCl	t/a	200	200	200
Polyphosphate	t/a	350	350	350
Sulphuric acid	t/a	70	70	70
NaOH	t/a	50	50	50

5.2.4
Oxygen plant area

Electric energy	MWh/a	50 500	65 000	41 000
Cooling water	m^3/a	$4.5 \cdot 10^6$	$5.3 \cdot 10^6$	$4 \cdot 10^6$

6
ECONOMIC SURVEY

6.
ECONOMIC SURVEY

6.1
ESTIMATION OF CAPITAL COST

6.1.1
Basis of capital cost estimate

Scope of estimates

The estimates covers the required process facilities of the alternatives. The other facilities such as workshop, laboratory, offices, site works, etc. as well as working capital are excluded from the study phase I, because they will be practically equal in each alternative and thus they do not have any effect on the comparison of the alternatives.

The following areas are included in the estimates:

- pyrite drying
- flash smelting
- flash smelting furnace gas handling
- elemental sulphur line
- sulphur purification and prilling
- matte roasting
- roasting furnace gas dedusting
- oxygen plant
- coal handling
- auxiliary boiler and superheater
- turbinegenerator plant
- water demineralization plant
- boiler feed water plant

Terminal points of estimates

The estimates are limited within the following terminal points

Pyrite: inlet to the day feed bins

Coal: inlet to the feed hopper

Bunker C oil: inlet to the day tank

Light fuel oil: inlet to the day tank

Iron calcine: outlet from the wet cooler belt conveyor

Slag: outlet from belt conveyor of slag granulation

Lime: inlet to the lime feed bin

Sulphur: outlet from the belt conveyors of prilling tower

Fresh water: inlet to the plant area

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

Taxes and duties

Supplies of Indian origin:

- excise duty 8 % of supplies
- sales tax 4 % of supplies

Supplies of foreign origin:

- custom duty 40 %
- engineering, commissioning etc. a duty of 25 %

Excluded capital cost

The estimate does not include the following cost:

- service facilities such as workshop, garage, laboratory, office, warehouse, first aid station and change house
- site work such as roads, railways, fences etc.
- storage facilities of pyrite, coal etc.
- mobile equipment
- infrastructures such as water supply, roads, railways, dumping areas etc.
- working capital
- escalation
- interest of construction period

Price level

The foreign supplies are estimated according to European price level, the cost basis being the price of level of first six months of the year 1983.

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

Foreign/Indian supplies

The capital cost are divided into foreign and Indian deals.

The foreign supplies include:

- some special process equipment such as high pressure boilers, steam dryers, cooling elements and refractories of flash smelting furnace, electrostatic precipitators etc.
- equipments and materials of instrumentation
- licence
- basic design as well as detail design of foreign supplies

- supervision of construction, erection and start up

- training outside India

The Indian supplies:

- equipment such as belt conveyors, bins, tanks, roasting furnaces, gas and air ducting, cyclones, catalyzers, condensing towers, standard pumps, low pressure boilers, steel structures of flash smelting furnace, steel plattforms, cranes etc.

- building and civil construction

- electrification equipment and materials

- piping and ducting equipment and materials

- erection and installation work

- detail design of buildings, civil work, electrification and piping

6.1.2
Fixed capital, Alternative 1 Rs 1000

Items	Basic price including freight and insurance		Taxes and duties			Cost at site		
	Indian supplies	Foreign supplies	Excise duty for Indian supplies 8 %	Custom duty for foreign supplies 40% (25%)	Sales tax of Indian supplies 4 %	Indian supplies	foreign supplies	Total
Engineering and design including flash smelting licence	11100	63100		15800	400	27300	63100	90400
Commissioning, supervision of erection and start up , training of staff	6100	48300		12100	200	18400	48300	66700
Equipment, free on site								
-smelter	32800	175600	2600	70200	1300	106900	175600	282500
-sulphur plant	168900	14500	13500	5800	6800	195000	14500	209500
-power plant and coal treatment	40700	103600	3200	41400	1600	86900	103600	190500
-oxygen plant	111000		8900		4400	124300		124300
Electrification, instrumentation and piping, free on site	117400	20400	9400	8100	4700	139600	20400	160000
Erection and installation	168500		13500		6700	188700		188700
Building constraction	74000		5900		3000	82900		82900
Subtotal	730500	425500	57000	153400	29100	970000	425500	1395500
Miscellaneous	146100	85100	11400	30700	5900	194000	85100	279100
Total	876600	510600	68400	184100	35000	1164000	510600	1674600

6.1.3
Fixed capital, Alternative 2 Rs 1000

Items	Basic price including freight and insurance		Taxes and duties			Cost at site		
	Indian supplies	Foreign supplies	Excise duty for Indian supplies 8 %	Custom duty for foreign supplies 40% (25%)	Sales tax of Indian supplies 4 %	Indian supplies	foreign supplies	Total
Engineering and design including flash smelting licence	13000	68800		17200	500	30700	68800	99500
Commissioning, supervision of erection and start up , training of staff	7800	55200		13800	300	21900	55200	77100
Equipment, free on site								
-smelter	31100	167000	2500	66800	1200	101600	167000	268600
-sulphur plant	158500	13900	12700	5500	6300	183000	13900	196900
-roasting plant	18800	2600	1500	1000	800	22100	2600	24700
-power plant and coal treatment	40700	103000	3300	41200	1600	86800	103000	189800
-oxygen plant	125000		10000		5000	140000		140000
Electrification, instrumentation and piping, free on site	130000	22000	10400	8800	5200	154400	22000	176400
Erection and installation	175000		14000		7000	196000		196000
Building constraction	77800		6200		3100	87100		87100
Subtotal	777700	432500	60600	154300	31000	1023600	432500	1456100
Miscellaneous	155540	86500	12120	30860	6200	204720	86500	291220
Total	933240	519000	72720	185160	37200	1228320	519000	1747320

6.1.4

Fixed capital, Alternative 3 Rs 1000

Items	Basic price including freight and insurance		Taxes and duties			Cost at site		
	Indian supplies	Foreign supplies	Excise duty for Indian supplies 8 %	Custom duty for foreign supplies 40% (25%)	Sales tax of Indian supplies 4 %	Indian supplies	foreign supplies	Total
Engineering and design including flash smelting licence	11100	63100		15800	400	27300	63100	90400
Commissioning, supervision of erection and start up , training of staff	6100	48300		12100	200	18400	48300	66700
Equipment, free on site								
-smelter	33100	164700	2700	65900	1300	103000	164700	267700
-sulphur plant	146100	12500	11700	5000	5800	168600	12500	181100
-power plant and coal treatment	40700	103600	3300	41400	1600	87000	103600	190600
-oxygen plant	98000		7800		3900	109700		109700
Electrification, instrumentation and piping, free on site	116000	20400	9300	8200	4600	138100	20400	158500
Erection and installation	163000		13000		6500	182500		182500
Building constraction	74000		5900		3000	82900		82900
Subtotal	688100	412600	53700	148400	27300	917500	412600	1330100
Miscellaneous	137600	82500	10700	29700	5500	183500	82500	266000
Total	825700	495100	64400	178100	32800	1101000	495100	1596100

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)

The estimate includes the direct operating costs such as wages and salaries of operating personnel, utilities and supplies, maintenance etc.

Such operating cost as administration, marketing, purchasing, transportation, laboratory services, insurances etc. are excluded because they have no practical effect on the comparison of the alternatives.

Unit prices used in the estimates

- Wages and salaries including social cost:

- managers	Rs	2 500 /month
- operating engineers	"	2 000 / "
- foremen	"	2 000 / "
- skilled labour	"	1 500 / "
- helpers	"	1 000 / "
- Buncer C oil	Rs	2 400 /ton
- light fuel oil	"	3 500 / "
- coal	"	250 / "
- lime	"	600 / "
- refractory bricks	"	8 000 / "
- mortar for bricks	"	6 000 / "
- cast refractory	"	6 000 / "
- oxygen lances for tapping	"	10 / kg
- tapping clay	"	2 000 / "
- sulphuric acid	Rs	900 / ton
- glass wool	Rs	700 / m^3
- fresh water	"	1 / "
- cooling water	"	0.5 / "
- catalyze mass	"	5 500 / "
- NaCl	"	500 / "
- NaOH	"	5 000 / "
- polyphosphate	"	4 500 / "
- Boiler chemicals	"	5 000 / "

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 to be fed to the smelter in alternative 1.

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

Variable cost	ALT 1 Rs 1000/a	ALT 2 Rs 1000/a	ALT 3 Rs 1000/a
- Raw materials (pyrite)	218,750	218,750	218,750
- Utilities and supplies (Appendix 6-1)			
- Flash smelting	50,074	47,274	41,524
- sulphur plant	38,068	32,758	30,488
- roasting	-	2,767	-
- power plant	31,473	32,133	30,473
- oxygen plant	2,250	2,650	2,000
- subtotal	121,865	117,582	104,485
- miscellaneous 5 %	6,000	5,900	5,200
- total utilities and supplies	127,865	123,482	109,685
Total variable cost	346,615	342,232	328,435

Fixed operating cost	ALT 1 Rs 1000/a	ALT 2 Rs 1000/a	ALT 3 Rs 1000/a
- Wages and salaries			
- plant manager (1)	30	30	30
- engineers (6)	144	144	144
- foremen (27)	648	648	648
- operating crew (170/178/170)	3,060	3204	3,060
- total wages and salaries	3,882	4,026	3,882
maintenance including materials and labour	55,000	57,000	54,000
subtotal	58,882	61,026	57,882
miscellanous 10 %	5,800	6,100	5,800
Total fixed operating cost	64,682	67,126	63,682

UTILITIES AND SUPPLIES
SMELTER

	Unit price Rs	ANNUAL CONSUMPTION ALT 1	ALT 2	ALT 3	ANNUAL COST Rs 1000 ALT 1	ALT 2	ALT 3
Coal	250/t	157,000 t	147,000 t	129,000 t	39,200	36,750	32,250
Light fuel oil	3,500/t	400 t	400 t	400 t	1,400	1,400	1,400
1) steam 70 bar			44,000 t	100,000 t			
1) steam 20 bar		150,000 t	124,000 t	139,000 t			
Fresh water	1/m^3	20,000 m^3	20,000 m^3	20,000 m^3	20	20	20
Cooling water	0.5/m^3	9.4 Mm^3	10.5 Mm^3	7.9 Mm^3	4,700	5,200	3,950
1) Electric energy		24,000 MWh	23,000MWh	21,000 MWh			
Refractory bricks	8,000/t	500 t	400 t	400 t	4,000	3,200	3,200
Mortar for bricks	6,000/t	32 t	32 t	32 t	192	192	192
Cast refractory	6,000/t	70 t	70 t	70 t	420	420	420
Oxygen lances	10/kg	8,000 kg	8,000 kg	8,000 kg	80	80	80
Tapping clay	2,000/t	6 t	6 t	6 t	12	12	12
					50,024	47,274	41,524

1) Will be produced inside the plant

UTILITIES AND SUPPLIES
SULPHUR PLANT

	Unit price Rs	ANNUAL CONSUMPTION ALT 1	ALT 2	ALT 3	ANNUAL COST Rs 1000 ALT 1	ALT 2	ALT 3
Bunker C oil	2,400/t	12,700 t	10,900 t	10,000 t	30,480	26,160	24,000
Sulphuric acid	900/t	400 t	400 t	400 t	360	360	360
1) steam 5.5 bar		90,000 t	90,000 t	90,000 t			
Fresh water	1/m^3	15,000 m^3	15,000 m^3	15,000 m^3	15	15	15
Cooling water	0.5/m^3	2.33 Mm^3	2.33 Mm^3	2.33Mm^3	1,165	1,165	1,165
1) electric energy		13,100 MWh	11,700 MWh	11,000 MWh			
Glass wool	700/m^3	500 m^3	500 m^3	500 m^3	350	350	350
Lime	600/t	330 t	330 t	330 t	198	198	198
Catalyte mass	5,500/t	1,000 t	820 t	800 t	5,500	4,510	4,400
					38,068	32,758	30,488

1) Will be produced inside the plant

UTILITIES AND SUPPLIES
ROASTING PLANT

	Unit price Rs	ANNUAL CONSUMPTION ALT 1	ALT 2	ALT 3	ANNUAL COST Rs 1000 ALT 1	ALT 2	ALT 3
Light fuel oil	3,500/t		350 t			1,225	
Coal	250/t		500 t			125	
Fresh water	1/m^3		2.6 Mm^3			1,300	
1) Electric energy			6,500 MWh				
Refractory bricks	8,000/t		10 t			80	
Mortar for bricks	6,000/t		0.4 t			2	
Cast refractory	6,000/t		5 t			30	
						2,767	

1) Will be produced inside the plant

UTILITIES AND SUPPLIES
DEMINERALIZATION AND POWER PLANT

	Unit price Rs	ANNUAL CONSUMPTION ALT 1	ALT 2	ALT 3	ANNUAL COST Rs 1000 ALT 1	ALT 2	ALT 3
Coal	250/t	26,000 t	29,000 t	22,000 t	6,500	7,250	5,500
Fresh water	1/m^3	475,000 m^3	475,000 m^3	475,000 m^3	475	475	475
Cooling water	0.5m^3	45 Mm^3	45 Mm^3	45 Mm^3	22,500	22,500	22,500
1) electric energy		12,500 MWh	12,500MWh	11,500 MWh			
NaCl	500/t	200 t	200 t	200 t	100	100	100
Polyphosphate	4,500/t	350 t	350 t	350 t	1,575	1,575	1,575
Sulphuric acid	900/t	70 t	70 t	70 t	63	63	63
NaOH	5,000/t	50 t	50 t	50 t	250	250	250
Boiler chemicals	5,000/t	2 t	2 t	2 t	10	10	10
					31,473	32,133	30,473

1) Will be produced inside the plant

UTILITIES AND SUPPLIES
OXYGEN PLANT

	Unit price Rs	ANNUAL CONSUMPTION ALT 1	ALT 2	ALT 3	ANNUAL COST Rs 1000 ALT 1	ALT 2	ALT 3
1) electric energy		50,500 MWh	65,000 MWh	41,000 MWh			
Cooling water	0.5/m^3	4.5 Mm^3	5.3 Mm^3	4.0 Mm^3	2,250	2,650	2,000
					2,250	2,650	2,000

1) Will be produced inside the plant

6.3
ESTIMATION OF REVENUES

The revenues are calculated only for elemental sulphur.

No value has been calculated for iron calcine (alt 2) or iron matte (alt 3).

The unit price of elemental sulphur is Rs 1350/t.

Annual production of elemental sulphur:

- Alt 1	217,000 t
- Alt 2	219,000 t
- Alt 3	195,000 t

Annual revenues:

- Alt 1	Rs 292,950,000
- Alt 2	Rs 295,650,000
- Alt 3	Rs 263,250,000

6.4
ECONOMIC COMPARISON

	Alt 1 Rs 1000	Alt 2 Rs 1000
Annual revenues	292,950	295,650
./.Annual operating cost		
-pyrite	218,750	218,750
-utilities and supplies	127,865	123,482
-fixed operating cost	64,682	67,126
Annual operating profit	-118,347	-113,708
./.Annuity of fixed investment according to rate of interest of 12 % and 15 years	245,830	256,500
Annual net profit	-364,177	-370,208

Additional alternative (alt 3):

	Rs 1000
Annual revenues	263,250
./.Annual operating cost	
-pyrite	218,750
-utilities and supplies	109,685
-fixed operating cost	63,682
Annual operating profit	-128,867
./.Annuity of fixed investment according to rate of interest of 12 % and 15 years	234,300
Annual net profit	-363,167

The comparison shows that the differences between the alternatives are very slight. Hcwewer, the alternatives 1 and 3 can be recommended , mainly because of lower investment cost.