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OUTOKUMPU ENGINEERING
A DIVISION OF OUTOKUMPU OY

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PYRITES, PHOSPHATES AND CHEMICALS LTD INDIA

INVESTIGATIONS TO PRODUCE ELEMENTAL SULHUR FROM AMJHORE PYRITE DEPOSIT

STUDY PHASE II

1.
SUMMARY

1 SUMMARY

1.1 Introduction

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

Additional information has been included based on discussions between PPCL and Outokumpu and on open questions in Final Report of Phase 1 of the subject study.

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

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

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

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

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

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

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

1.2 Process Selected

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

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

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

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

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

1.3 Economic evaluation

1.3.1 Capital cost

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

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

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

The total fixed capital amounts as follows:

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

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

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

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

1.3.2
Financing of the investment

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

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

Financing plan of the construction period Rs 1000:

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

1.3.3
Operating cost

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

The summarized estimation results in the following annual operating expenses:

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

1.3.4
Revenues

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

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

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

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

1.3.5
Profitability

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

The profitability is calculated for four cases:

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

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

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

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

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

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

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

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

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

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

Sensitivity analysis

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

1.4 Conclusions

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

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

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

1.5 Discussion

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

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

1.5.1 Arsenic Removal

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

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

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

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

1.5.2 Slag Removal

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

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

1.5.3 Parallel Equipment

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

Multicoil Dryers

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

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

Electrostatic Precipitators

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

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

Cold Catalyzers

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

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

Sulphur Condensing Towers

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

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

Liquid Sulphur Cooling Boilers

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

Process Air Fans, Process Gas Fans

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

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

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

Slag Granulation Equipment

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

Pumps

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

1.5.4
Grain Size of the Feed Material

Concentrates

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

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

Silica (Top Shale)

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

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

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

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

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

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

1.5.5 Stack Emission of Sulphur Compounds

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

1.5.6 Sulpnur Prilling

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

1.5.7 Starting of Oxygen Plant 9 MW Motor

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

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

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

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

1.5.8
Oxygen enrichment

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

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

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

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

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

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

1.5.9

Effluents

The main effluents from the process are as follows

- Slag granulate and flue dust

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

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

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

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

Main components of the slag are:

Fe	45 %
SiO_2	32 %
Al_2O_3	6 %
S	1.6 %

and of the flue dust:

SiO_2	31 %
Fe	22 %
AlO_3	12 %
C_2	10 %
S	6 %

Sulphur washing wastes

Effluents from the sulphur autoclave washing water handling are

- filter drum cake
- oveflow water

Filter drum cake formation rate is 370 kg/h of which moisture content is 110 kg/h. Insoluble As_2S_3 is 2 % of solid material, the rest being elemental sulphur and gypsum.

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

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

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

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

Exhaust gas

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

Gas analysis is

CO	0.11 %
SO_2	0.05 %
H_2O	23.6 %
CO_2	17.3 %
O_2	1.3 %
N_2	57.6 %

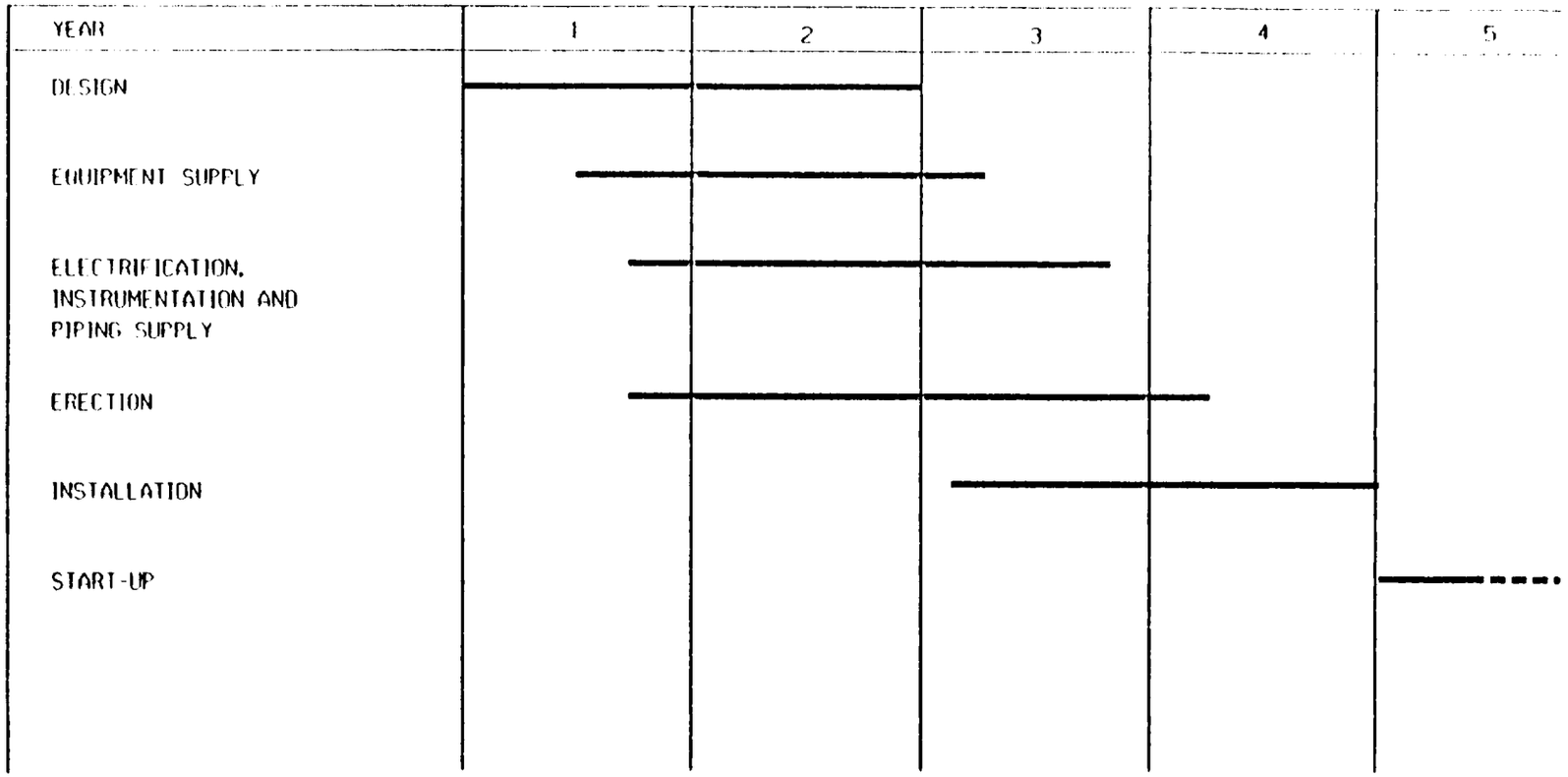
Boiler blow-down steam

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

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

1.6
Overall Schedule for Plant Supply

Bar Chart Schedule,
Dwg No. 360 901 100 011-3 Rev0



REVISION NO.	REVISIONS	DATE	DRAWN	CHECKED	APPROVED	APPD. FOR CONST.
0	FOR STUDY	1 MARCH 1985	IR			

OUTOKUMPU OY
ENGINEERING DIVISION

DESIGNED	1 MARCH 1985	AKI
CHECKED		
APPROVED		

CLIENT: PYRITES, PHOSPHATES & CHEMICALS LTD.

CLIENT'S DWG NO.

PROJECT: PPCL PYRITE SMELTER

SCALE

REF. DWG

DRAWING TITLE: OVERALL SCHEDULE FOR PLANT SUPPLY

DWG NO.	REV. NO.
360 901 100 011-3	0

2.
BASIC DATA

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

2.2 Raw Materials

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

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

ATTACHMENT

All hand made corrections were agreed in meeting between TPCL/FEDO/ Outokumpu on 22-23th July 85.

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

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

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 Sone River, which is about 4 Kms. away.

2.6 Fuel Oil

Layout of existing system	:	HSD oil and petrol tank is installed in the project site.
Diagram of existing system		
Oil pressure		
Connection points		
Capacity of storage tanks	:	Tank for HSD oil and petrol having 15000 litres capacity each.

2.7 Electricity

Layout of existing system	:	Shown in the map
Diagram of existing system		
Voltage, phase and frequency for various efficiency range of motors, lighting and instrumentation.	:	11 KV transmiesion 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.

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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. : 50°C (during summer)

Min. : 4°C (during winter)

4.2 Air pressure

Average : Normal

Max. : Not available

Min.

4.3 Relative humidity

Average :

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

Min. :

....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	:	626,250 M.T.
6.2	Design capacity and design philosophy of the power plant.	:	Most of the requirement of complex and complete requirement of smelter will be met through captive power plant.
6.3	Pyrite		
	Chemical assay Mineralogical analysis Moisture Grain size, screen analysis	:	Given separately in the enclosed sheet.

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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

		Month	No. of tripings	Duration of power off
Failures in electric power feed	:			
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 F.. CAPITAL COST ESTIMATE

7.1 Building and construction work

Unit prices for the following:

- Piling(50 M long, 660 mm dia) : Rs. ~~23,000~~ 52,000/ per each

....9/...

		Foundation	Rs. 1,350/m^3
		Column	Rs 2,800/m^3
		Slab	Rs 1,850/m^3
		Beam	Rs 2,100/m^3
- concrete mass, ready installed including boarding and steel reinforcements.	...	Rs. ~~2,250/m^3~~	
- supporting steel constructions ready installed, painted	...	Rs. ~~8,000~~/Te.	10,000/t
- walls and roofings of industrial buildings	...	Rs. ~~100~~/m^2	65/m^2
- offices, change rooms	...	Rs. ~~1,200~~/m^2	1,500/m^2
- earth excavation	...	Rs. ~~15~~/m^3	11/m^3
- earth filling	...	Rs. ~~15~~/m^3	20/m^3
- rock blasting	...	Rs. ~~50~~/m^3	35/m^3
- asphalt covers	...	Rs. 100/m^2	

7.2	Equipment and materials	...	Materials and manuf.	Transport and erect.
	- Mild steel construction, ready installed		Rs.	Rs.
	- sheets		20/kg	3 ~~2~~/kg
	- profiles		30/kg	3 ~~2~~/kg
	- Acid proof steel sheets construction, ready installed		180/kg	3 ~~2~~/kg
	- Plastics			
	- pvc			150/kg
	- reinforced plastics		~~100~~/kg	150/kg
	- PE		10/kg	
	- Lead lining, ready installed			
	- sheet lining(3 mm thick)		1100/m^2	
	- homogenous lining		5000/m^2	
	- Heat insulation, ready installed inc. covers.			
	- thickness 100 mm		~~350~~/m^2	400/m^2
	- thickness 200 mm		~~550~~/m^2	600/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	3 2/kg
- Tanks, bins etc. of mild steel.	...	20/kg	3 2/kg
- Tanks of acid proof steel	...	180/kg	
- Tanks of reinforced plastics..		~~80~~/kg 125/kg	3 2/kg
- Gas ducts of mild steel	...	20/kg	3 2/kg

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

- Pumps
  - type - horizontal,centri-fugal.
  - capacity 25 m^3/hr.
  - pressure 50 MLC ... Rs. 29,000.00 ~~18,310.00~~ 10%
  - material SS 316
  - electric power 10 HP drive
- Belt conveyors
  - type-horizontal, troughed, three roll ground conveyor
  - capacity 200 TPH ... Rs. 1,000,000.00 ~~345,000.00~~ 10% 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.

  80,000.00
  Rs. ~~40,050.00~~ 10%

- Boilers
  - capacity - 20 TPH
  - fuel to be used-Fuel oil
  - pressure - 12 kg./cm^2

  Total Rs. 55 ~~38~~ lakhs

- Lorries
  - type - ordinary
  - loading capacity-12 Te.

  250,000.00
  Rs. ~~200,000.00~~

- Fork lift trucks
  - type
  - lifting capacity

- Front end loaders
  - type - Tyre mounted
  - capacity - 153 m^3

  1,700,000.00
  Rs. ~~1,011,300.00~~ --

- Electric motors
  - power - 75 HP
  - voltage - 415 V
  - rotating speed-1500 rpm

  type - synchronous, TEFC squirrel cage

  Rs. 60,000.00 Rs. 6,000.00

- Ball mills
  - diameter - 1.5 M
  - length - 2.4 M
  - lining material-Rubber
  - electric motor- 75 HP

  4,500,000.00
  Rs. ~~1,018,000.00~~ 150,000.00
  Rs. ~~100,000.00~~

....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
  - voltage Rs.750,000.00
- Transformers 500...1500KVA:1000 KVA;11KV/433V, A*TRANSFORMER
  - Voltage Rs. ~~1,10,000.00~~ 1,600,000.00
- Cables (3 core)
  - cross section area 120 mm^2 Rs. ~~70~~ 90/m -
  - insulation PVC (steelwire armoured)
- Cable racks Rs.10/kg 200 mm Rs 235/m
- Instrumentation Cable Trays Material-Al./Anodized Al Rs.125/m. 100 mm Rs 110/m, 500 mm Rs 670/m

7.4 Piping: cost of materials and erection, sizes specified

	Rs.	
- welded steel pipes	~~15~~/kg	24/kg
- seamless steel pipes	~~18~~/kg	20/kg
- Acid proof steel pipes	~~100~~/kg	200/kg
- Copper pipes	60/kg	
- Plastic pipes	25-300/kg	
- Lead pipes	~~25~~/kg	40/kg
- High pressure pipes	20/kg	
- Curves (Carbon-steel)	~~20~~/kg	35/kg
- Collars and flanges (Carbon-steel)	~~25~~/kg	
- T-pieces	20/kg	

- Valves
  - Carbon steel, 15-250 NB
  - Gate (Rs. 700-~~5000~~) 50,000
  - Globe(Rs.400-~~5000~~) 50,000

....13/...

- Pipe bridges and fittings 15 ~~12~~/kg

7.5 Erection and installation work

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

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

- local suppliers ~~8~~ 12% excise duty; 4% S.T.
- foreign supplies ~~40%~~ customs duty of CIF prices
- Engg.commissioning etc. ~~25%~~ 45

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~~	258.00	Te
Fuel oil	~~2400.00~~	3,141.00	Te
Natural gas	-		-
~~Electricity~~	~~0.65~~		~~kwh~~
Propone (LPG)	~~3.25~~	5.64	kg.
Sulphuric Acid	~~900.00~~	1,500.00	Te
Lime	600.00		Te
Limestone	20 to 30		Te
HCl (30% Acid)	330.00		Te
NaOH(Solid-Rayon Grade)	6500.00		Te
Grinding balls for ball mill	10000.00		Te
Refractory bricks	8.00		brick
- chrome magnesite			
- shamotte	Not available in India		

....14/...

8.2 Wages and salaries including social costs:

	Rs.	Rs
Managers	~~2,500~~/-	3,000/-
Operating Engineers) Foreman)	~~2,000~~/-	2,500/-
Skilled labour	~~1,500~~/-	1,800/-
Unskilled labour	~~1,000~~/-	1,200/-

8.3 Daily, weekly and annual operating time of personnel.

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

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

Road freights Rs. 0.25 to 0.~~35~~/ton km.

Railway freights Depends on material transported and gauge of rail-line.

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

9. DATA FOR ESTIMATION OF REVENUES

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

Iron calcine No value

- Fe appr. 65%
- S " 0.5%
- Cu " 0.05%
- SiO2 " 5%

Elemental sulphur(liquid) 2,323/-

Elemental sulphur (solid) Rs. ~~1,350~~/- for fertilizer use and Rs. ~~1,500~~/- for non-fertilizer use. 2,573/-

So_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%~~ 6.67 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~~ two years
interest	- ~~11.5%~~ 13.0 for long term loan and ~~10%~~ 17.5 for short term loan.
Pay back period	- 10 years.

10.4 ~~Monetary units tobe usad~~ 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	~~0.0005~~ % 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	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 %

2.2.8
Lime stone

$CaCO_3$	80 %

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 um and moisture 8 %.

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

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

3.1.1.2
Flash Smelting

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

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

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

3.1.1.3
Reduction and Process Gas Handling

After the reaction shaft the gas contains SO2 and therefore reduction of the gas is carried out in th uptake shaft of the flash smelting furnace in order to produce elemental sulphur. The following main re actions take place in reduction:

$C + CO2 \quad ---> 2CO$

$SO2 + 2CO \quad ---> 0.5\ S2 + 2CO2$

$SO2 + 2H2 \quad ---> 0.5\ S2 + 2H2O$

$S2 + 2H2 \quad ---> 2H2S$

At the same time the oxidic dust components are sul hidized.

In the rear end of the settler part coal dust is burned w. h oxygen enriched air to raise the temper ture of the smelting gas for the reduction.

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

The maximum sulphur production is obtained when the gas after reduction contains a little less SO2 than half of the sum (H2S + H2 + CO + COS).

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

The reduced process gas together with molten dust i fed into the waste heat boiler, where cooling and solidyfying of dust compounds take place. The boile consists of a radiation chamber and convection sec- tion. The gas is cooled to 350oC by the boiler and saturated steam is produced at 70 bar. A minor part of the dust is separated in the boiler and the rema ning dust in two electrostatic precipitators workin parallel at a temperature of 360oC.

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

When the gas is being cooled in the waste heat boi- ler, many reactions take place between gas compo- nents:

$2\ CO + SO2 \rightarrow 2\ CO2 + 1/n\ Sn$

$2\ CO + S2 \rightarrow 2\ COS$

$2\ H2 + SO2 \rightarrow 2H2O + 1/n\ Sn$

$2\ H2 + S2 \rightarrow 2\ H2S$

Also sulphur vapour S2 polymerizes to S4, S6 and S8.

3.1.2
Sulphur Plant Area

3.1.2.1
Sulphur Recovery

After the elctrostatic precipitators the cleaned gas is led into the sulphur condensing boiler, where the gas is further cooled down to 150oC and at he 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 430oC in the gas reheater by burning fuel oil with air.

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

$2\ CO + SO2 \rightarrow 1/n\ Sn + 2\ CO2$

$COS + H2O \rightarrow H2S + CO2$

These reactions are exothermic and thus the process gas temperature increases to 480oC. A high alumina cement with Al2O3 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 250oC before cold catalyzers.

The main reaction of the cold catalyzers is:

$SO2 + 2\ H2S \rightarrow 3/n\ Sn + 2\ H2O$

The reaction is slightly exothermic and increases the temperature of the gas to about 260oC. 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 is meets the process gas counter-currently cooling down the gas to 135oC and condensing sulphur from the gas.

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

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

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

Minor amounts of H_2O in the gas are converted mainly to SO_2 by an incinerator, where oil is burned. The gas temperature after the incinerator is 400 °C.

Before directing into the stack the gas is still washed with a scrubber-absorption tower system, in scrubber by water and in absorption tower by lime stone slurry. Thus the SO_2-percentage of the gas is reduced to 0.05 % with no H_2S. Temperature of the exhaust gas is 60°.

3.1.2.2
Sulphur Washing

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

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

3.1.2.3
Sulphur Prilling

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

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

3.1.3
Additional Plant Areas

3.1.3.1
Power Plant

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

Main part of the high pressure steam is superheated up to 500 oC in a separate, coal fired superheater. The superheated steam is then used for generation of electric power in a turboalternator. Part of the waste heat boiler steam is reduced to 20 bar and used in the steam dryers.

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

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

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

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

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

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

3.1.3.2
Coal Plant

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

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

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

3.1.3.3
Oxygen Plant Area

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

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

The purity of produced oxygen is 95 %.

3.1.3.4
Water Treatment Plant

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

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

3.1.3.5
Lime Stone Slurry Preparation Plant

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

The limestone is ground and screened before mixing with water. The CaCO3 - content of the limestone is 80 %.

3.1.3.6
Compressed Air Station

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

3.2
Process Calculations

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

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

Boiler pressure figures are absolute values.

3.2.1
Flash Smelting Area

Steam Dryer

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

Flash Smelting Furnace

Pyrite		t/h	83.5
Top Shale		t/h	20.0
Air to reaction shaft		m^3/h	65700
Oxygen to reaction shaft		m^3/h	15150
- temperature		°C	40
- oxygen enrichment		%	35.2
Distribution and leakage air		m^3/h	2000
Slag		t/h	67.2
Gas after smelting		m^3/h	80100
- temperature		°C	1390
- analysis	H_2	%	0.2
	H_2S	%	0.0
	CO	%	0.5
	SO_2	%	26.7
	S_2	%	1.4
	H_2O	%	4.5
	CO_2	%	2.7
	N_2	%	64.0

Coal to settler		t/h	3.2
Combustion air		m^3/h	13700
Oxygen		m^3/h	1800
- temperature		°C	40
- oxygen enrichment		%	30
Coal for reduction		t/h	17.6
Injection air		m^3/h	2200
Flue dust		t/h	10.6
Gas after furnace		m^3/h	115000
- temperature		°C	1230
- analysis	H_2	%	1.2
	H_2S	%	1.1
	CO	%	5.6
	COS	%	0.2
	SO_2	%	3.6
	S_2	%	7.6
	H_2O	%	9.3
	CO_2	%	16.3
	N_2	%	55.1

Waste heat boiler

Flue dust from boiler		t/h	2.1
Steam production		t/h	111
- pressure		bar	70
- feed water temperature		°	150
Gas after boiler		m^3/h	108700
- temperature		°C	350
- analysis	H_2	%	0.2
	H_2S	%	1.7
	CO	%	2.1
	COS	%	1.2
	SO_2	%	2.2
	$S_2...S_8$	%	2.9
	H_2O	%	10.5
	CO_2	%	20.2
	N_2	%	59.0

Electrostatic Precipitators

Flue dust from precipitators		t/h	8.5
Gas after precipitator		m^3/h	112200
-temperature		°C	360
-analysis	H_2	%	0.2
	H_2S	%	1.5
	CO	%	1.7
	COS	%	1.3
	SO_2	%	2.3
	$S_2,\ldots,S_8$	%	2.8
	H_2O	%	12.6
	CO_2	%	19.7
	N_2	%	57.9

3.2.2 Sulphur Plant Area

Sulphur condensing boiler and demister

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

Gas reheater

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

Hot catalyzer

Gas after catalyzer		m^3/h	125500
- temperature		°C	480
- analysis	H_2S	%	1.85
	CO	%	0.08
	COS	%	0.10
	SO_2	%	1.17
	S_2,S_4,S_6	%	0.50
	H_2O	%	13.0
	CO_2	%	21.8
	N_2	%	61.5

Gas cooling boiler

Sulphur production		t/h	1.4
Steam production		t/h	22.7
- pressure		bar	5.5
- feed water temperature		°C	150
Gas after boiler		m^3/h	125100
- temperature		°C	250

Cold catalyzers

Gas after catalyzers		m^3/h	124800
- temperature		°C	259
- analysis	H_2S	%	0.52
	CO	%	0.07
	COS	%	0.08
	SO_2	%	0.52
	S_6,S_8	%	0.44
	H_2O	%	14.4
	CO_2	%	22.0
	N_2	%	62.0

Sulphur condensing towers and demister

Sulphur production		t/h	4.9
Gas after demister		m^3/h	127000
- temperature		°C	135
- analysis	H_2S	%	0.51
	CO	%	0.07
	COS	%	0.08
	SO_2	%	0.51
	S_8	%	0.01
	H_2O	%	14.3
	CO_2	%	21.6
	O_2	%	0.4
	N_2	%	62.5

Sulphur cooling boilers

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

Incinerator

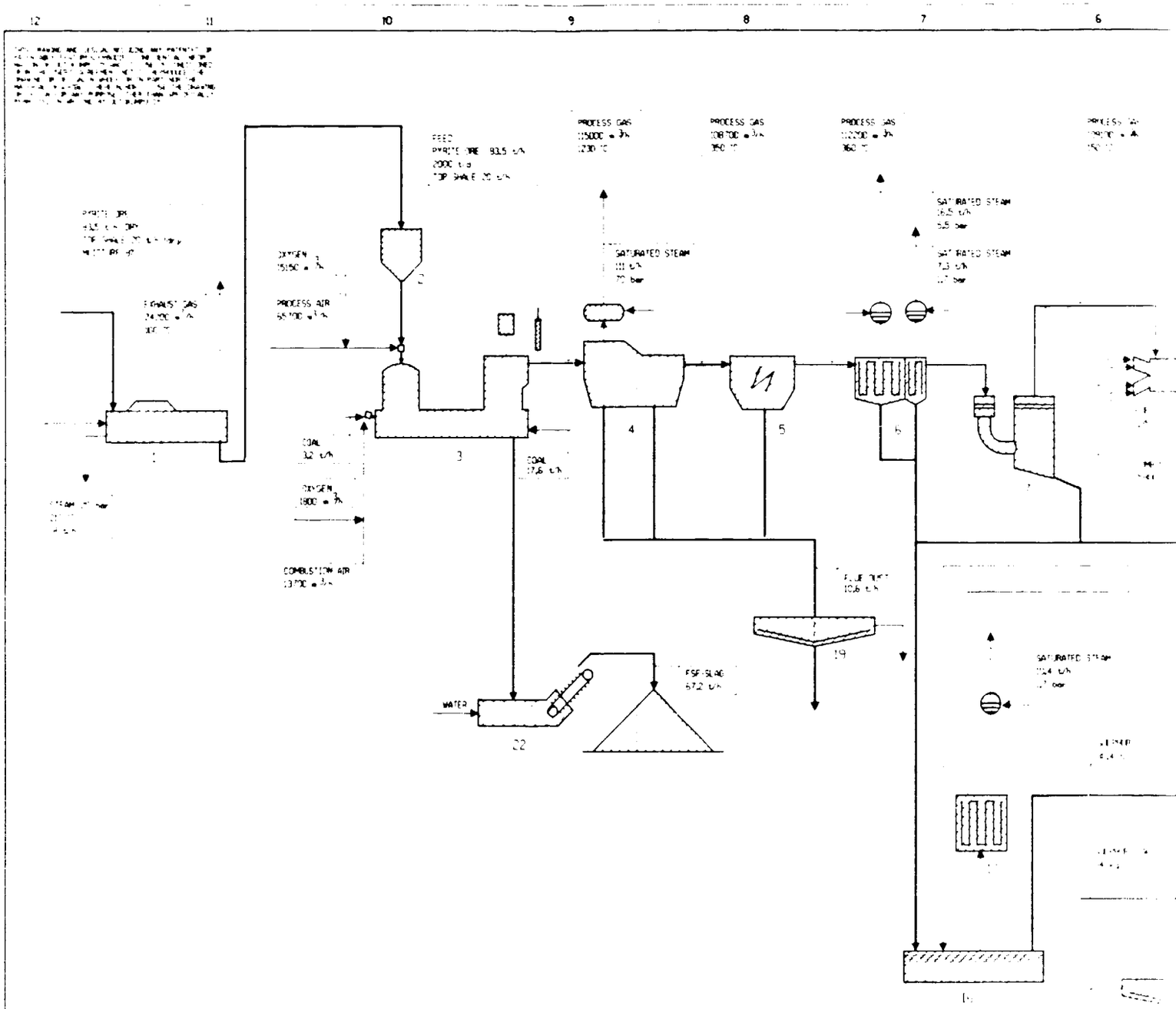
Oil		t/h	1.2
Combustion air		m^3/h	14000
Secondary air		m^3/h	16200
Gas after incinerator		m^3/h	158000
- temperature		°C	400
- analysis	CO	%	0.13
	SO_2	%	1.23
	H_2O	%	13.9
	CO_2	%	18.5
	O_2	%	1.5
	N_2	%	64.7

Prescrubber and absorber

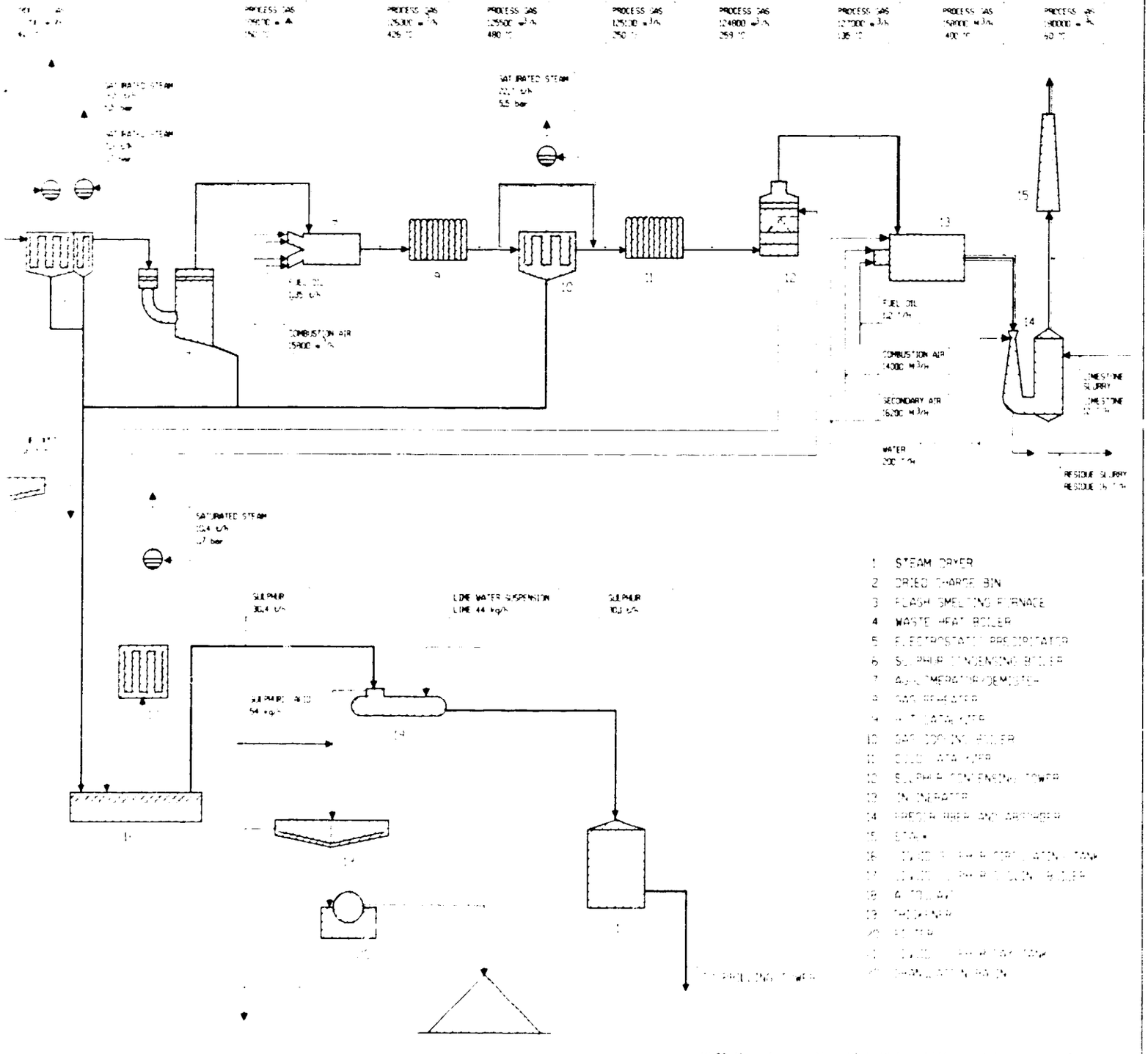
Prescrubber water		t/h	200
Limestone (80 % $CaCO_3$)		t/h	12
Residue (dry)		t/h	16
Gas after absorber		m^3/h	180000
- temperature		°C	60
- analysis	CO	%	0.11
	SO_2	%	0.05
	H_2O	%	23.6
	CO_2	%	17.3
	O_2	%	1.3
	N_2	%	57.6

MATERIAL BALANCE OF THE FLASH SMELTING FURNACE

	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	20000	10.8	2160	11.2	2240	50.4	10080	13.2	2640	2.6	520
Coal	20760	0.5	100	3.6	750	10.4	2160	5.2	1080	64.8	13450
			35200		32820		25000		5460		14800
Out:											
Slag	67140	1.65	1105	45.4	30470	32.3	21700	6.2	4170		
Flue dust	10580	6.0	635	22.3	2350	31.2	3300	12.2	1290	10.8	1140
Furnace gas			33460								13660
			35200		32820		25000		5460		14800

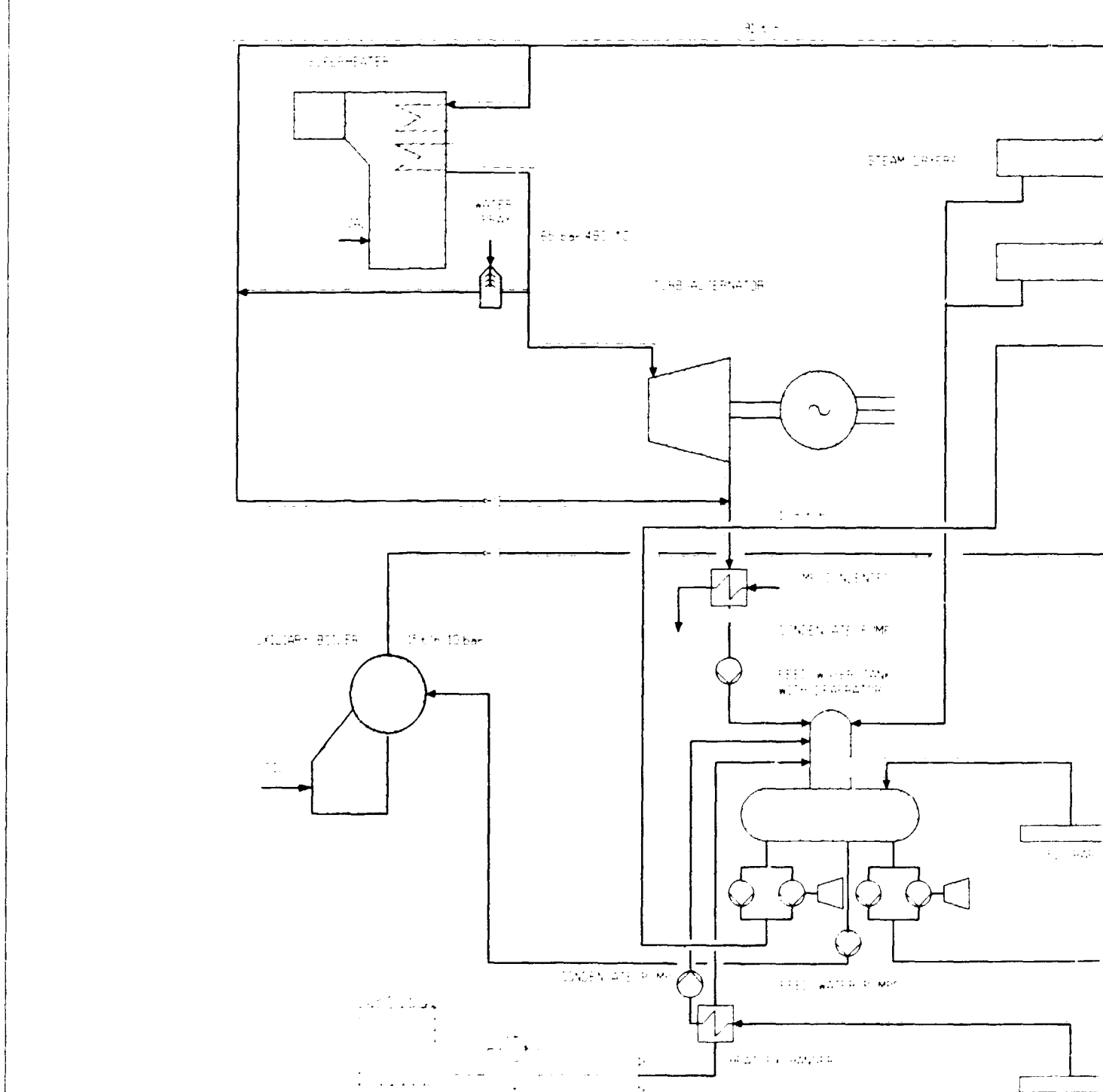

FEED
PYRITE ORE 93,5 t/h
2000 t/d
OIL SHALE 25 t/h
PROCESS GAS
115000 m³/h
1230 °C
PROCESS GAS
108700 m³/h
950 °C
PROCESS GAS
112200 m³/h
360 °C
SATURATED STEAM
16,5 t/h
5,5 bar
SATURATED STEAM
111 t/h
70 bar
SATURATED STEAM
7,3 t/h
2,7 bar
OXYGEN
15150 m³/h
PROCESS AIR
55700 m³/h
EXHAUST GAS
24200 m³/h
100 °C
COAL
3,2 t/h
COAL
17,6 t/h
OXYGEN
1800 m³/h
COMBUSTION AIR
13700 m³/h
FLUE GAS
10,6 t/h
SATURATED STEAM
12,4 t/h
2,7 bar
WATER
FSF-SLAG
67,2 t/h
1
2
3
4
5
6
19
22

SECTION 1

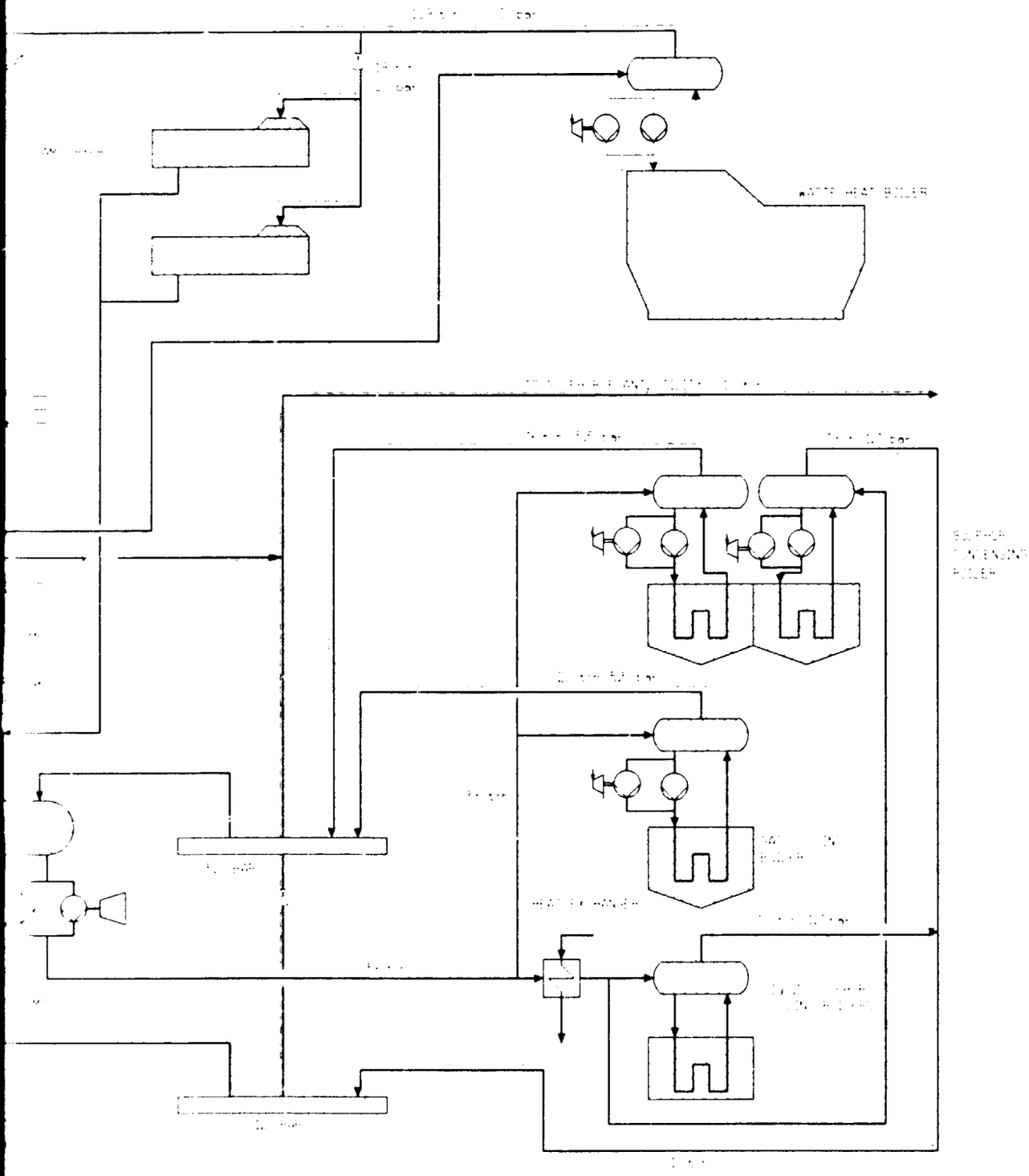


SECTION 2

OUTOKUMPU OY



SECTION 1



SECTION 2

OUTOKUMPU OY

4
PLANT DESIGN

4.8 Drawings

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

4
PLANT DESIGN

4.1
Plant Description

4.1.1
General

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

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

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

4.1.2
Flash Smelter Area 200

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

4.1.2.1
Dryer and FSF Feed Area 210

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

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

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

4.1.2.2
Flash Smelting Furnace Area 220

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

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

containing gases and iron and silica rich slag.

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

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

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

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

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

4.1.2.3
Process Gas Handling Area 230

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

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

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

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

4.1.2.4
Flue Dust Handling Area 240

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

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

4.1.3
Sulphur Plant Area 300

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

4.1.3.1
Sulphur Recovery Area 310

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

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

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

Heated gases flow to hot catalyzer unit where additional elemental sulphur forms in the gas mainly from SO2.

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

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

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

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

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

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

4.1.3.2
Sulphur Handling Area 320

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

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

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

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

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

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

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

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

4.1.3.3
Waste Liquid Handling Area 330

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

4.1.4
Additional Plant Areas

4.1.4.1
Coal Plant Area 500

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

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

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

4.1.4.2
Power Plant 600

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

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

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

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

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

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

4.1.4.3
Oxygen Plant 700

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

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

4.1.4.4
Lime Stone Slurry Preparation Area 800 (IN OFFSITE FACILITIES)

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

4.1.4.5
Water Treatment Area 900 (IN OFFSITE FACILITIES)

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

4.1.4.6
Compressed Air Station 950

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

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

4.2
List of Equipment with Main Technical Data

4.2.1
Coding

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

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

EQ. GROUP	EQ. TYPE	EQ. CODE
Lifting devices	Overhead travelling crane	318
	Crane	
Mills	Mill	325
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
	Feed tank	514
	Measuring tank	515
	Mixing tank	516
	Pump tank	518
	Jacket and spray water tank	519
	Storage tank	519
	Reactor tank	521
Thickeners	Thickeners	532
Turbines	Steam turbine	556
Valves	Disc valve	562
	Emergency valve	569

4.2.2
Equipment List (In Volume II)

Smelter and Sulphur Plant

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

Coal Plant

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

Power Plant

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

4.3
ELECTRIFICATION
4.3.1
Description of electrification

General principles

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

Main transformer station

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

The rated power of the main transformer is 40 MVA.

Power plant

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

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

The rated power of the generator is about 25 MW.

11 kV auxiliary switchgears

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

Smelter
Sulphur handling
Oxygen plant

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

The rs are to be placed in ventilated s.

440 V motor cont

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

Transformers

Following transformers will be required:

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

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

Emergency power

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

Control system

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

Lighting and welding outlets

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

Light pillars and masts will be used for area lighting.

Welding outlets will be located in all necessary working areas.

Power demands

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

Flash smelter area	4,5
Sulphur recovery area	1,4
Sulphur handling area	2,0
Oxygen plant	10,0
Coal handling area	1,4
Power plant	1,2
Off-site facilities	2,9
$P_{inst.}$	23,4 MW

Normal running load

Running load at full capacity 17,5 MW

Cos y = 0,8

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

Engineering criteria of electrification

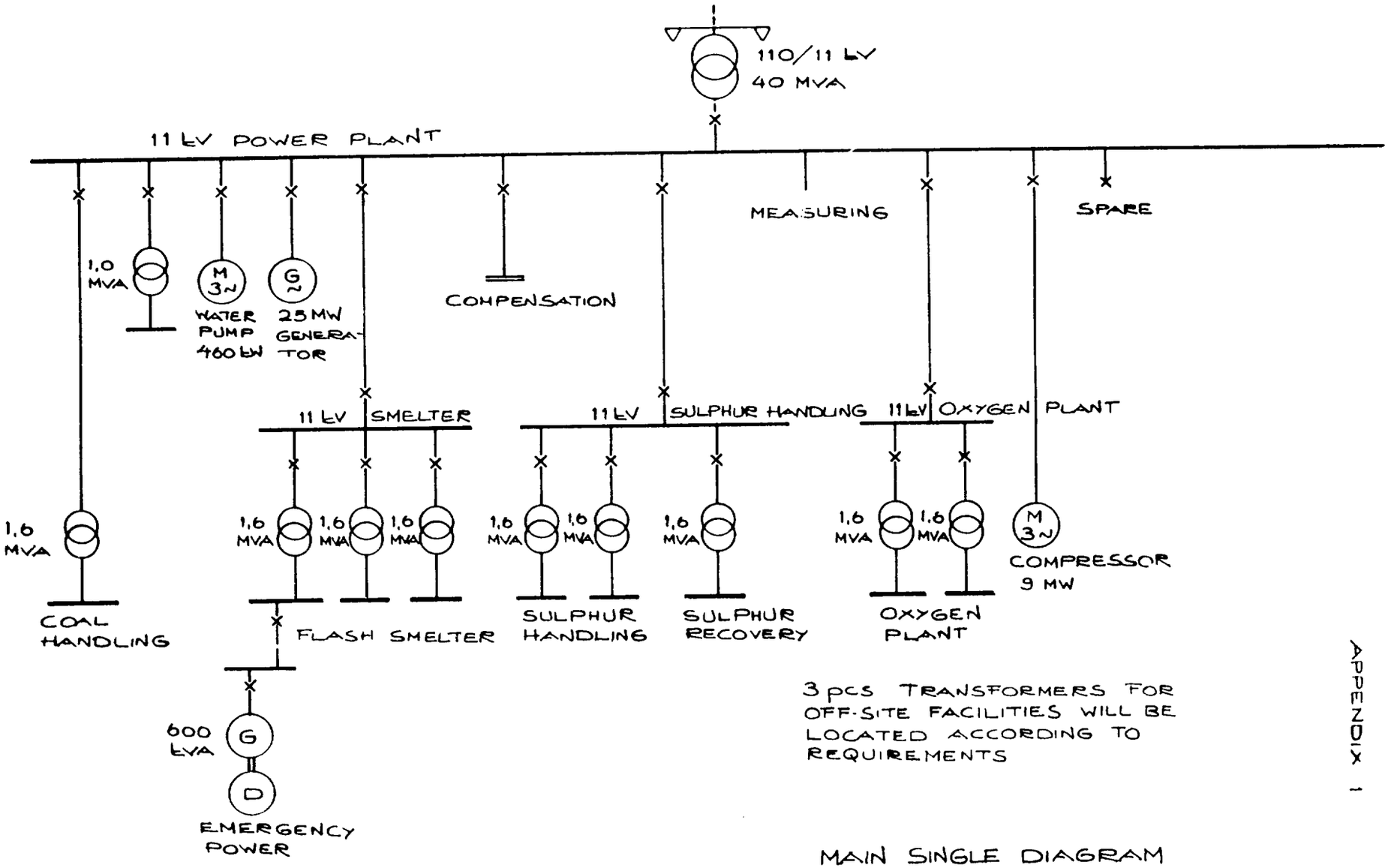
Voltages	Power supply	110 kV	3 ph	50 Hz
	Primary distribution	11 kV	3 ph	50 Hz
	Motors over 350 kW	11 kV	3 ph	50 Hz
	Motors 350 kW and below	440 V	3 ph	50 Hz
	Control (motors)	220 V	1 ph	50 Hz
	Control (HV-distrib.)	110 V	DC	

Short circuit capacities

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

Energy consumption
(estimated operating time 7500 h/year)

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



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

MAIN SINGLE DIAGRAM

APPENDIX 1

LIST OF MAIN ELECTRICAL EQUIPMENT

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

4.3.2
Motor List

In Volume II

4.4
INSTRUMENTATION

4.4.1
General Description of Instrumentation

CONTENTS

1.0
DESIGN CONCEPTS

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

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

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

The following factors shall be given special consideration.

The number of operators required to operate the plant.

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

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

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

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

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

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

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

2.0
CONTROL ROOMS, CONTROL PANELS AND OPERATOR WORK STATIONS

2.01 A central control room (CCR) with control panels and operator work stations will be provided. The control room shall be the point of control for operating and/or monitoring the process and will contain the necessary instrumentation and controls to operate the process.

2.02 Colour TV-display units and Operator Work Station (OWS) with dynamic keyboard shall be used for DCS.

2.03 A free standing control panel with semigraphic diagram on the top part shall be provided for CCR. The vertical section of the panel shall include complementary analog instruments. The sloping console section shall include start-stop push buttons for motors, selector switches, ammeters etc.

2.04 There will also be a Relay Room (RR) near CCR for auxiliary equipment and electronic cabins of DCS.

2.05 The CCR and the Relay Room shall be pressurized with filtered air to exlude dust and noxious gases (SO_2 and H_2S) and shall be air conditioned to maintain suitable constant temperature and humidity.

2.06 There will also be a control room for elementary sulphur plant. One sub OWS of DCS shall be located there. Certain operations of the sulphur plant will be controlled from this control room. A conventional control panel like that at CCR, shall be provided there, too.

2.07 The other plant of the area (Power Plant, Oxygen Plant and Coal Powder Plant) shall have their own control systems. However, the operations of these plants are depending on each other because their processes shall be connected together. That is why adequate information transmission between them shall be absolutely necessary. Information connections between the plants will be defined on Basic Engineering.

3.0
FIELD MOUNTED INSTRUMENTATION, WIRING AND PIPING

3.01 Field Mounted transmitters shall be two (2) wire type wherever possible. For certain special applications, where two (2) wire transmitters are not available, four (4) wire transmitters may be used.

3.02 Enclosures for field mounted instruments shall be DIN IP54 dust tight and water tight construction. Classification for hazardous application location, if required, shall be specified on the data sheets.

3.03 Instruments located outdoors and subject to severe ambient conditions including moisture, freezing and corrosion, shall be protected either by heating and/or shall be installed in weatherproof housing or shelters. The use of protective housing, or enclosures shall not inhibit the functioning of the instrument or detract from the ability to perform routine service.

3.04 All automatic control valves shall be provided with isolating block and bypass valves, unless dupliction of equipment and lines allows control valve replacement without shutting down the process. Control valves which are not provided with isolating block valves and bypass shall be supplied with a manual handwheel or other means for hand operation.

3.05 Instrument signals and alarm wiring shall be designed with twisted pair cable with aluminum mylar electrostatic shielding, a bare copper drain wire and overall PVC jacket. The cable shall be suitable and approved for installation in cable trays.

3.06 Multipair cables shall generally be used to connect the field junction box to the control panel. The cable characteristics shall be same as above except each pair of conductors shall be individually shielded and have a bare copper drain wire.

3.07 The primary instrument connection shall be the responsibility of piping section. These connections will include process block valves, thermowell or probe couplings and flanges.

3.08 The instrument process piping material including tube, valves and fittings shall be 316 stainless steel.

3.09 The tubing runs for pneumatic transmission signals, and connections between filter-regulators and instruments, shall be made with 6 mm outside diameter 316 stainless steel tubing with 1.0 mm wall thickness.

3.10 Tube fittings for pneumatic system shall be 316 stainless steel compression type.

4.0
POWER SUPPLIES, SIGNALS AND UNITS OF MEASUREMENT

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

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

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

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

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

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

4.07 The following transmission signal levels shall be used:

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

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

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

5.0
DRAWINGS AND DATA

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

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

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

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

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

4.4.2
Preliminary Loop Number Schedule for Instrumentation

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

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

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

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

Attached are 16 sheets of Loop Number Schedules.

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed	Checked	Approved
Aug. 84 SUN		

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 360 FBA AS 001

Rev. No

Area 00 UTILITIES

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FIQK - 00101	OXYGEN CONSUMPTION	/	⊖	/						
PIAR - 00102	PRESS. OF OXYGEN	/	⊖					/		P-CORRECTION FOR FIQK 11
TT - 00103	TEMP. OF OXYGEN									T-CORRECTION FOR FIQK 11
FIQL - 00104	INSTRUMENT AIR CONSUMPTION	/	⊖	/						
PAR - 00105	INSTR. AIR PRESSURE	/	⊖					/		P-CORRECTION FOR FIQL
TT - 00106	INSTR. AIR TEMPERATURE									T-CORRECTION FOR FIQL
FIQL - 00107	COMPRESSED AIR	/	⊖	/						
PIAR - 00108	AIR PRESSURE	/	⊖					/		P-CORRECTION FOR FIQL
TT - 00109	TEMP. OF COMPRESSED AIR									T-CORRECTION FOR FIQL
FIQK - 00110	PROCESS WATER	/	⊖	/						
PIAR 00111	PROCESS WATER	/	⊖					/		
FIQL 00112	DEMINERALISED WATER	/	⊖	/						
PIAR - 00113	DEMINERALISED WATER	/	⊖					/		

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER X SULPHUR (IAN)

Designed	Checked	Approved
Aug -84 SIVA		

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 360 FHO 163 001

Rev. No

Instr. diagram No

Area: 01 CONCENTRATE BAY BINS, FLUX/COKE BIN ETC

Function

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking		Special serv.	Notes
LAL - 01 101	CONCENTRATE BIN 1							/			X	TRAFFIC LIGHT FOR PAYLOADER
LAH - 01 102	CONCENTRATE BIN 1							/			X	TRAFFIC LIGHT FOR PAYLOADER
LSHH - 01 103	CONCENTRATE BIN 1								X			CONN. TO ELECTRIFICATION
LAL - 01 104	CONCENTRATE BIN 2							/			X	TRAFFIC LIGHT FOR PAYLOADER
LAH - 01 105	CONCENTRATE BIN 2							/			X	TRAFFIC LIGHT FOR PAYLOADER
LSHH - 01 106	CONCENTRATE BIN 2								X			CONN. TO ELECTRIFICATION
LAL - 01 107	CONCENTRATE BIN 3							/			X	TRAFFIC LIGHT FOR PAYLOADER
LAH - 01 108	CONCENTRATE BIN 3							/			X	TRAFFIC LIGHT FOR PAYLOADER
LSHH - 01 109	CONCENTRATE BIN 3								X			CONN TO ELECTRIFICATION
LAL - 01 110	FLUX BIN							/			X	TRAFFIC LIGTH FOR PAYLOADER
LAH - 01 111	FLUX BIN							/			X	TRAFFIC LIGTH FOR PAYLOADER
LSHH - 01 112	FLUX BIN								X			CONN TO ELECTRIFICATION
FAL - 01 113	CONCENTRATE BELT FEEDER 1							/				
FAL - 01 114	CONCENTRATE BELT FEEDER 2							/				
FAL - 01 115	CONCENTRATE BELT FEEDER 3							/				
FIQ - 01 116	TOTAL CONCENTRATE FEED TO THE DRYER	/	Θ	/			/					
FFIQ 01 117	CONCENTRATE / FLUX RATIO	/	Θ	/			/					
HC - 01 118	AIR JETS FOR BUILD-UP, CONC. BIN 1				/							
HC - 01 119	AIR JETS FOR BUILD UP, CONC. BIN 1				/							
HC - 01 120	AIR JETS FOR BUILD UP, CONC BIN 2				/							
HC - 01 121	AIR JETS FOR BUILD UP CONC BIN 2				/							
HC - 01 122	AIR JETS FOR BUILD UP, CONC BIN 3				/							
HC - 01 123	AIR JETS FOR BUILD UP CONC. BIN 3				/							
HC - 01 124	AIR JETS FOR BUILD UP, FLUX BIN				/							
HC - 01 125	AIR JETS FOR BUILD UP, FLUX BIN				/							
SAL - 01 126	BELT CONV STOPED							/				

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

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Arj 8/1		
SUN		

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 360 FHO 163 001

Rev. No

Area 12 DRYING AND DRIED CHARGE BINS

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FIQ - 02 101	STEAM CONSUMPTION OF THE DRYER 1	/		/						
FIQ - 02 102	STEAM CONSUMPTION OF THE DRYER 2	/		/						
PIC - 02 103	STEAM PRESSURE OF THE DRYER 1	/					/			SLAVE CONTR OF TIC - 01105
PIC - 02 104	STEAM PRESSURE OF THE DRYER 2	/					/			SLAVE CONTR. OF TIC - 01106
TIC - 02 105	TEMP OF CONCENTRATE AT OUTPUT D.1	/				/				SET POINT TO PIC-02 103
TIC - 02 106	TEMP. OF CONCENTRATE AT OUTPUT D.2	/				/				SET POINT TO PIC-02 104
LIC - 02 107	CONDENSATE COLLECTION VESSEL DR 1									LOCAL CONTROLLER
LIC - 02 108	CONDENSATE COLLECTION VESSEL DR 2						○			LOCAL CONTROLLER
LSH - 02 10[illegible]	FEED FUNNEL OF THE DRYER 1							/	X	CONN TO ELECTRIFICATION
LSH - 02 110	FEED FUNNEL OF THE DRYER 2							/	X	CONN TO ELECTRIFICATION
PDAH - 02 111	PRESSURE DROP OF THE BAG FILTER							/		
WIA - 02 112	DRIED CHARGE BIN	/						/		
LSHH - 02 113	DRIED CHARGE BIN								X	CONN TO ELECTRIFICATION
SICA - 02 114	DRAG CONVEYOR	/					/	/		SLAVE CONTR OF WIC-02 117
SICA - 02 115	DRAG CONVEYOR	/					/	/		SLAVE CONTR OF WIC-02 117
LSHH - 02 116	DRIED CHARGE BIN								X	CONN. TO ELECTRIFICATION
WICA - 02 117	DRIED CHARGE BIN	/				/		/		SET POINT TO SIC-02114, SIC-02115
[illegible]IA - 02 118	PNEUMATIC CONVEYOR	/						/		

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed	Checked	Approved
Aug 24 '84		

Drawing title: **INSTRUMENT LOOP NO SCHEDULE**

Drawing No: 360 FHO 163 001

Rev. No:

Area: CHARGE FEEDING, AIR, OXYGEN

Function:

Instr. diagram No:

Loop No	Service	Indication	Recording	Integration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FICQ - 03101	CHARGE FEED, DRAG CONV. 220-223-100	/	(R)	/			/			
FICQ - 03102	CHARGE FEED, DRAG CONV. 220-223-200	/	(R)	/			/			
SIA - 03103	SPEED OF THE DRAG CONV 220-223-100	/						/		
SIA - 03104	SPEED OF THE DRAG CONV. 220-223-200	/						/		
FFIC - 03105	CONCENTRATE/OXYGEN RATIO	/	(R)				/		X	
PIT - 03106	PRESSURE OF PROCESS AIR									P-CORRECTION FOR FLOW IA
PSL - 03107	PRESSURE OF PROCESS AIR								X	
TT - 03108	TEMP OF PROCESS AIR									T-CORRECTION FOR FLOW IA
HC - 03109	SHUT-OFF VALVE OF PROCESS AIR				/					
HC - 03110	SHUT-OFF VALVE OF PROCESS AIR				/					
PIA - 03111	PRESSURE OF PROCESS AIR	/						/		
AIT - 03112	OXYGEN PERCENT OF PROCESS AIR	/	(R)							
FFIC - 03113	OXYGEN ENRICHMENT PERCENT	/	(R)	/			/			
PT - 03114	PRESSURE OF OXYGEN									P-CORRECTION FOR FLOW
TT - 03115	TEMP OF OXYGEN									T-CORRECTION FOR FLOW
PIA 03116	PRESSURE OF OXYGEN	/						/		
PSL - 03117	PRESSURE OF OXYGEN								X	
HC 03118	SHUT-OFF VALVE OF OXYGEN				/					
PICA 03119	PRESSURE REDUCTION OF OXYGEN	/					/	/		
HC - 03120	EMERGENCY SHUT-OFF VALVE OF OXYGEN				/					
FICA - 03121	PRESSURE OF FLASH SMELTING FURNACE	/				/		/		MASTER CONTROLLE FOR PIC-04107
TI - 03122	ARC TEMP. OF FLASH SMELTING FURNACE	/								
TI - 03123	ARC TEMP OF FLASH SMELTING FURNACE	/								
TI - 03124	TAKE-UP SHAFT OF FSF	/								
TJR - 03125	TAKE-UP SHAFT OF FSF		(R)							
PDIA - 03126	PRESSURE DROP OF TAKE UP SHAFT THROAT	/						/		

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTING AND SOLVENT EXTRACTION

Designed: Aug '84 SUN | Checked | Approved

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No: 360 FHA 162 351

Rev. No

Instr. diagram No

Area: 03 COAL BURNERS OF SETTLER

Function

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FIC-03201	COAL RATE, BURNER 1	/		/			/			
FIC-03202	COAL RATE, BURNER 2	/		/			/			
FIC-03203	COAL RATE, BURNER 3	/		/			/			
FIC-03204	COAL RATE, BURNER 4	/		/			/			
FIC-03205	COAL RATE, BURNER 5	/		/			/			
FIC-03206	COAL RATE, BURNER 6	/		/			/			
FFIC-03207	COAL/OXYGEN RATIO, BURNER 1	/					/			
FFIC-03208	COAL/OXYGEN RATIO, BURNER 2	/					/			
FFIC-03209	COAL/OXYGEN RATIO, BURNER 3	/					/			
FFIC-03210	COAL/OXYGEN RATIO, BURNER 4	/					/			
FFIC-03211	COAL/OXYGEN RATIO, BURNER 5	/					/			
FFIC-03212	COAL/OXYGEN RATIO, BURNER 6	/					/			
PT-03213	PRESSURE OF COMBUSTION AIR									P-CORRECTION FOR FLOW FI.
TT-03214	COMBUSTION AIR									T-CORRECTION FOR FLOW FI.
FI-03215	CARRYING AIR FLOW, BURNER 1	/								
FI-03216	CARRYING AIR FLOW, BURNER 2	/								
FI-03217	CARRYING AIR FLOW, BURNER 3	/								
FI-03218	CARRYING AIR FLOW, BURNER 4	/								
FI-03219	CARRYING AIR FLOW, BURNER 5	/								
FI-03220	CARRYING AIR FLOW, BURNER 6	/								
PT-03221	CARRYING AIR PRESSURE									P-CORRECTION FOR FLOW
TT-03222	CARRYING AIR TEMP.									T-CORRECTION FOR FLOW
HC-03223	SHUT-OFF VALVE OF OXYGEN				/					
FIA-03224	OXYGEN ENRICHMENT FOR SETTLER BURNERS									
PIA-03225	OXYGEN PRESSURE	/						/		
PSL-03226	OXYGEN PRESSURE								X	
AIC-03227	OXYGEN ENRICHMENT PERCENT OF COMB. AIR	/					/			
HC-03228	SHUT OFF VALVE OF COMBUSTION AIR				/					

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PHCL INDIA

Project: FLASH SMELTING AND CONVERTING PLANT

Designed: Arq. RK 2001 | Checked | Approved

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No: 360 FHO 163 011

Rev. No

Area: 03 COOLING WATER BRICK LINING

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
LICA - 03301	SPRAY WATER TANK	/					/	/		
LICA - 03302	JACKET WATER TANK	/					/	/		
FIA - 03303	MAKE - UP WATER							/		
PAL - 03304	PRIMARY COOLING WATER							/		
FIAS - 03305	SPRAY WATER	/						/	X	
FIAS - 03306	JACKET WATER	/						/	X	
PAL - 03307	SPRAY WATER							/		
PAL - 03308	JACKET WATER							/		
TIA - 03309	SPRAY WATER SUPPLY LINE	/						/		
TIA - 03310	SPRAY WATER RETURN LINE	/						/		
TIA - 03311	JACKET WATER SUPPLY LINE	/						/		
TIA - 03312	JACKET WATER RETURN LINE	/						/		
TI - 03313	PRIMARY COOLING WATER AT INLET OF HEAT EXCH	/								
TI - 03314	PRIMARY COOLING WATER AT OUTLET OF HEAT EXCH.	/								
TI - 03315	PRIMARY COOLING WATER AT INLET OF HEAT EXCH	/								
TI - 03316	PRIMARY COOLING WATER AT OUTLET OF HEAT EXCH.	/								
TIA - 03317	REACTION SHAFT BRICK LINING	/						/		
TIA - 03318	REACTION SHAFT BRICK LINING	/						/		
TIA - 03319	REACTION SHAFT BRICK LINING	/						/		
TIA - 03320	REACTION SHAFT BRICK LINING	/						/		
TI - 03321...6	BOTTOM BRICK LINING OF FURNACE									THERMOCOUPLES FOR HEATING UP
TI - 03321	MATTE TAPPING HOLES	○								PORTABLE INSTRUMENT
TI - 03322	SLAG TAPPING HOLES	○								PORTABLE INSTRUMENT

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed	Checked	Approved
[illegible]		
SJJ		

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 360 FHO 162 301

Rev. No

Area 13 REDUCTION

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FI - 03401	CARRYING GAS FLOW	/								
PT - 03402	CARRYING GAS									P-CONNECTION FOR FLOW
TT - 03403	CARRYING GAS									T CONNECTION FOR FLOW
FIC - 03404	ROTARY SCALE COAL INJECTOR 1	/		/			/			SLAVE CONTRR OF AIC-05.120
FIC - 03405	ROTARY SCALE COAL INJECTOR 2	/		/			/			SLAVE CONTRR. OF AIC-05.120
FIC - 03406	ROTARY SCALE COAL INJECTOR 3	/		/			/			SLAVE CONTRR OF AIC-05. 120
FIC - 03407	ROTARY SCALE COAL INJECTOR 4	/		/			/			SLAVE CONTRR OF AIC-05. 120

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: WASH SMELTER AND SULPHUR PLANT

Designed: Aug 84 SUH | Checked | Approved

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No.: 360 THO 163 A11

Rev. No

Area: 04 WASTE HEAT BOILER, EL. STATIC PRECIP.

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FIQ - 04101	STEAM FLOW	/		/						
FIQ - 04102	FEED WATER FLOW	/		/						
FIAS - 04103	CIRCULATION WATER	/						/	X	
LICA - 04104	DRUM LEVEL	/					/	/		
PICA - 04105	STEAM PRESSURE OF DRUM	/					/	/		
PDA - 04106	PRESSURE DROP OF PROCESS GAS	/						/		
PICA - 04107	GAS PRESSURE INSIDE THE BOILER	/					/	/		SLAVE CONTROL OF PICA-03121
HC - 04108	FEED WATER BY PASS VALVE				/					
HC - 04109	MAIN STEAM VALVE				/					
HC - 04110	START-UP STEAM VALVE				/					
PIA - 04111	FEED WATER PRESSURE	/						/		
TIA - 04112	FEED WATER TEMPERATURE	/						/		
LSL - 04113	DRUM LEVEL							/	X	
CIA - 04114	BOILER WATER CONDUCTIVITY	/						/		
FI - 04115	CONTINOUS BLOW-OUT OF THE DRUM	/								
TI - 04116	GAS TEMP OF RADIATION PART OF THE BOILER	/								
TIA - 04117	GAS TEMP. AT BOILER OUTLET	/						/		
TJR - 03.125.2	GAS TEMP AT BOILER OUTLET		E							
SAL - 04119	DRAG CONVEYOR OF FLUE DUST							/		
HC - 04120	DISC VALVE AT INLET OF EL. STATIC PRECIP.				/					
HC - 04121	DISC VALVE AT INLET OF EL. STATIC PRECIP.				/					
HC - 04122	BY-PASS EJECTOR				/					

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ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed	Checked	Approved
Aug-84		
SUH		

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No: 360 FHO 162 01

Rev. No

Instr. diagram No

Area: 01 ELECTROSTATIC PRECIPITATORS

Function

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
II - 04201	SECONDARY CURRENT OF PRECIPITATOR FIELD 1	/								
II - 04202	SECONDARY CURRENT OF PRECIPITATOR FIELD 2	/								
II - 04203	SECONDARY CURRENT OF PRECIPITATOR FIELD 3	/								
VI - 04204	SECONDARY VOLTAGE OF PRECIPITATOR FIELD 1	/								
VI - 04205	SECONDARY VOLTAGE OF PRECIPITATOR FIELD 2	/								
VI - 04206	SECONDARY VOLTAGE OF PRECIPITATOR FIELD 3	/								
HC - 04207	SECONDARY VOLTAGE CONTROL FIELD 1				/					
HC - 04208	SECONDARY VOLTAGE CONTROL FIELD 2				/					
HC - 04209	SECONDARY VOLTAGE CONTROL FIELD 3				/					
XI - 04210	SPARK RATE FIELD 1	/								
XI - 04211	SPARK RATE FIELD 2	/								
XI - 04212	SPARK RATE FIELD 3	/								
TA - 04213	TOP PART OF THE PRECIPITATOR	/						/		AT/AA ALARMING FOR FIRE DET.
TA - 04214	TOP PART OF THE PRECIPITATOR	/						/		AT/AA ALARMING FOR FIRE DETECT.
TJR - 03.125.3	TOP PART OF THE PRECIPITATOR	/	⟵					/		AT/AA ALARMING FOR FIRE DETECT
TA - 04216	BOTTOM PART OF THE PRECIPITATOR	/						/		—"—
TA - 04217	BOTTOM PART OF THE PRECIPITATOR	/						/		—"—
TJR - 03.125.4	BOTTOM PART OF THE PRECIPITATOR	/	⊖					/		—"—
XA 04218	MALFUNCTION OF THE PRECIPITATOR							/		
FIQ - 04220	HEATING STEAM FOR ISOLATORS	/		/						
SAL - 04221	DRAG CONVEYOR OF FLUE DUST							/		
SAL 04222	DRAG CONVEYOR OF FLUE DUST							/		
PA - 04223	PRESSURE AT OUTLET OF THE PRECIPITATOR	/						/		
TJR - 03.125.5	TEMP. AT OUTLET OF THE PRECIPITATOR	/	⊖							
HL - 04225	BY PASS EJECTOR									

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

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Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 260 E40 163 001

Rev. No

Area 1-4 ELECTROSTATIC PRECIPITATORS

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
II - 04231	SECONDARY CURRENT OF PRECIPITATOR FIELD 1	/								
II 04232	SECONDARY CURRENT OF PRECIPITATOR FIELD 2	/								
II - 04233	SECONDARY CURRENT OF PRECIPITATOR FIELD 3	/								
VI - 04234	SECONDARY VOLTAGE OF PRECIPITATOR FIELD 1	/								
VI - 04235	SECONDARY VOLTAGE OF PRECIPITATOR FIELD 2	/								
VI - 04236	SECONDARY VOLTAGE OF PRECIPITATOR FIELD 3	/								
[illegible] 04237	SECONDARY VOLTAGE CONTROL FIELD 1				/					
[illegible] 04238	SECONDARY VOLTAGE CONTROL FIELD 2				/					
[illegible] 04239	SECONDARY VOLTAGE CONTROL FIELD 3				/					
XI - 04240	SPARK RATE FIELD 1	/								
XI 04241	SPARK RATE FIELD 2	/								
XI 04242	SPARK RATE FIELD 3	/								
TIA - 04243	TOP PART OF THE PRECIPITATOR	/						/		AT/81 ALARMING FOR FIRE DETECT
TIA 04244	TOP PART OF THE PRECIPITATOR	/						/		"
TIR - 03.125.6	TOP PART OF THE PRECIPITATOR	/	⊖					/		"
TIA - 04246	BOTTOM PART OF THE PRECIPITATOR	/						/		"
TIA 04247	BOTTOM PART OF THE PRECIPITATOR	/						/		"
TIR - 03.125.7	BOTTOM PART OF THE PRECIPITATOR	/	⊖					/		"
XA - 04249	COMMON MALFUNCTION ALARM OF THE PRECIP							/		
FIQ - 04250	HEATING STEAM FOR ISOLATORS	/		/						
SAL - 04251	DRAG CONVEYOR OF FLUE DUST							/		
SAL - 04252	DRAG CONVEYOR OF FLUE DUST							/		
PIA 04253	PRESSURE AT OUTLET OF THE PRECIPITATOR	/						/		
TIR - 03.125.8	TEMP. AT OUTLET OF THE PRECIPITATOR	/	⊖							
HC - 04255	BY-PASS EJECTOR									

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed	Checked	Approved
Aug-84 SJN		

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No: 360 FHO 163 001

Rev. No:

Instr. diagram No:

Area: 04 PROCESS GAS FANS

Function:

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
JIAH - 04301	POWER OF PROCESS GAS FAN	/						/		
NAH - 04302	VIBRATION							/		
TAH - 04303	WINDING OF MOTOR							/		
TAH - 04304	MOTOR & FAN BEARING							/		
SI - 04305	SPEED OF PROCESS GAS FAN	/								
JIAH - 04306	POWER OF PROCESS GAS FAN	/						/		
NAH - 04307	VIBRATION							/		
TAH - 04308	WINDING OF MOTOR							/		
TAH - 04309	MOTOR & FAN BEARING							/		
SI - 04310	SPEED OF PROCESS GAS FAN	/								
TJK - 04125 G	PROCESS GAS TEMP AT OUTLET OF THE FANS		⊖							

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed	Checked	Approved
Aug-21 (SBA)		

Drawing title: **INSTRUMENT LOOP NO SCHEDULE**

Drawing No. 360 PHO 163 601

Rev. No

Area: 05 SULPHUR PLANT, GAS LINE

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FI - 05101	PROCESS GAS AT INLET OF SULPHUR CONDENSING BOILER	/								
TI - 05102	" "	/								
TJR - 05103	" "		⊖							
FI - 05104	FEED WATER FOR 5.5 BAR BOILER	/								
FIQ - 05105	STEAM OF 5.5 BAR BOILER	/		/						
FIAS - 05106	CIRCULATION WATER OF 5.5 BAR BOILER	/						/	X	
LICA - 05107	DRUM LEVEL OF 5.5 BAR BOILER	/					/	/		
PIC - 05108	STEAM PRESSURE OF 5.5 BAR BOILER	/					/			
FI - 05109	FEED WATER FOR 1.7 BAR BOILER	/								
FIQ - 05110	STEAM OF 1.7 BAR BOILER	/		/						
FIAS - 05111	CIRCULATION WATER OF 1.7 BAR BOILER	/						/	X	
LICA - 05112	DRUM LEVEL OF 1.7 BAR BOILER	/					/	/		
PIC - 05113	STEAM PRESSURE OF 1.7 BAR BOILER	/					/			
PI - 05114	PROCESS GAS PRESSURE AT OUTLET OF THE BOILER	/								
TI - 05115	TEMP. AT OUTLET OF SULPHUR COND. BOILER	/								
TJR - 05.103.2	" "		⊖							
PI - 05.116	PROCESS GAS PRESS. AT OUTLET OF AGGLOMERATOR	/								
TI - 05.117	PROCESS GAS AT OUTLET OF DEMISTER-AGGLOM.	/								
PI - 05.118	" "	/								
TJR - 05.103.3	" "		⊖							
HC - 05.119	BY-PASS VALVE OF DEMISTER-AGGLOMERATOR				/					
AICR - 05.120	PROCESS GAS CHROMATOGRAPH FOR SO_2, H_2S, COS	/	⊖			/				MASTER CONTRR FOR COAL INJECTION
PI - 05.121	PROCESS GAS PRESS AT OUTLET OF GAS FAN	/								
TI - 05.122	PROCESS GAS TEMP AT INLET OF GAS REHEAT	/								
TJR - 05.103.4	" "		⊖							
TIC - 05.123	PROCESS GAS TEMP. AT OUTPUT OF GAS REHEATER	/				/		/	X	MASTER CONTRR. OF FUEL AMMOUN
TJR - 05.103.5	" "		⊖							
PIA 05.124	PROCESS GAS PRESS. AT INLET OF HOT CATALYZER	/						/		

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: FACT INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed: Aug 84 SOM | Checked: | Approved:

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No.: 264 FHA 462 001

Rev. No:

Area: 05 SULPHUR PLANT GAS LINE

Function:

Instr. diagram No:

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
PT 05125	PROCESS GAS PRESS AT OUTLET OF HOT CATALYZER	/								
TIA - 05126	PROCESS GAS TEMP. AT OUTLET OF HOT CATALYZER	/						/		
TJR - 05103.6	"		Θ							
PT - 05127	PROCESS GAS PRESS AT OUTLET OF GAS COOL BOILER	/								
TIC - 05128	PROCESS GAS TEMP AT OUTLET OF GAS COOL BOILER	/					/	/		
TJR - 05103.7	"		Θ							
FT - 05129	FEED WATER FOR GAS COOLING BOILER	/								
FIQ - 05130	STEAM OF GAS COOLING BOILER	/		/						
FIAS - 05131	CIRCULATION WATER OF GAS COOLING BOILER	/						/	X	
LICA - 05132	DRUM LEVEL OF GAS COOLING BOILER	/					/	/		
PIC - 05133	STEAM PRESSURE OF GAS COOLING BOILER	/					/			
FICQ - 05134	FUEL OIL OF THE GAS REHEATER BURNER 1	/		/			/			SLAVE CONTR OF TIC - 05 123
FFIC - 05135	COMBUSTION AIR FOR REHEATER BURNER 1	/					/			
TT - 05136	TEMP OF COMBUSTION AIR									T-CORRECTION FOR FLOW
PT - 05137	PRESS. OF COMBUSTION AIR									P CORRECTION FOR F. VOL
FICQ 05138	FUEL OIL OF THE GAS REHEATER BURNER 2	/		/			/			SLAVE CONTR OF TIC - 05 12.
FFIC - 05139	COMBUSTION AIR BURNER 2	/					/			
TT - 05140	TEMP OF COMBUSTION AIR									T-CORRECTION FOR FLOW
PT - 05141	PRESS. OF COMBUSTION AIR									P-CORRECTION FOR FLOW
PIA - 05142	PROCESS GAS PRESS AT OUTLET OF COLD CATALYZER	/						/		
TIA - 05143	PROCESS GAS TEMP. AT OUTLET OF COLD CATALYZER 1	/						/		
TJR - 05103.8	"		Θ							
PIA - 05144	PROCESS GAS PRESS. AT OUTLET OF COLD CATALYZER 2	/						/		
TIA - 05145	PROCESS GAS TEMP AT OUTLET OF COLD CATALYZER 2	/						/		
TJR - 05103.9	"		Θ							
PIC - 05146	PROCESS GAS PRESS AT OUTLET OF COND. TOWER 1	/				/		/		MASTER CONTR. OF SIC - 05 17
TIA - 05147	PROCESS GAS TEMP. AT OUTLET OF COND TOWER 1	/						/		
TJR - 05103.10	"		Θ							

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed: Aug-84 SNM | Checked | Approved

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 260 FHO 163 001

Rev. No

Area: 05 SULPHUR PLANT, GAS LINE

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
PIA 05148	PROCESS GAS PRESS. AT OUTLET OF COND. TOWER 2	/				/				MASTER CONTR OF SIC-05115
TIA - 05149	PROCESS GAS TEMP. AT OUTLET OF COND. TOWER 2	/						/		
TJA 05 1211	"		⊖							
PI - 05150	PROCESS GAS PRESS. AT OUTLET OF EX GAS FAN	/								
TI - 05151	PROCESS GAS TEMP AT OUTLET OF EX GAS FAN	/								
PI - 05 152	PROCESS GAS PRESS. AT OUTLET OF DEMISTER	/								
TI - 05153	PROCESS GAS TEMP. AT OUTLET OF DEMISTER	/								
TJR 05103.12	"		⊖							
AIA - 05154	PROCESS GAS CHROMATOGRAPH FOR SO_2, H_2S, COS	/	⊖					/		
PDA - 05155	PRESSURE DROP OF VENTURI SCRUBBER	/						/		
TIA - 05156	EX GAS TEMP. AT OUTLET OF VENTURI SCRUBB	/						/		
PDA 05157	PRESSURE DROP OF ABSORBTION TOWER	/						/		
TIA - 05158	TEMP OF EX GAS AT OUTLET OF AB ER	/						/		
FIA - 05159	SCRUBBING WATER OF VENTURI SCRUBBER	/						/		
FIA - 05160	"	/						/		
FIA - 05161	CIRCULATION FLOW OF LIME MILK	/						/		
FIA - 05162	FLOW RATE OF CIRC. LIME MILK	/						/		
LIC - 05163	LIQUID LEVEL OF CIRC. LIME MILK	/					/			1
LAH - 05164	COOLING WATER LEVEL OF VENTURI SCRUBBER							/		
LAH - 05165	LIME MILK LEVEL OF ABSORBTION TOWER							/		
JIA - 05166	POWER OF EX. GAS FAN 1	/						/		
NAH 05167	VIBRATION OF EX GAS FAN 1							/		
TAH 05168	WINDING OF EX GAS FAN MOTOR							/		
TAH - 05169	MOTOR X FAN BEARING OF EX. GAS FAN							/		
SIC - 05170	SPEED OF THE FAN	/					/			SLAVE CONTRL OF PIC-05116
JIA 05171	POWER OF EX GAS FAN 2	/						/		
NA - 05172	VIBRATION OF EX GAS FAN 2							/		
TAH 05173	WINDING OF EX GAS FAN MOTOR							/		

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: PPCL INDIA

Project: FLASH SMELTER AND SULPHUR PLANT

Designed: Aug-84 SJH | Checked: | Approved:

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No.: 360 FHO 162 111

Rev. No:

Area: 05 SULPHUR PLANT, GAS LINE

Function:

Instr. diagram No:

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
TAH - 05174	MOTOR & FAN BEARING OF EX. GAS FAN 2							/		
SIC - 05175	SPEED OF EX. GAS FAN 2	/					/			SAME CNTER OF PIC-05148
VA - 05176	VIBRATION OF GAS FAN 310-212-0100							/		
TAH - 05177	WINDING OF GAS FAN MOTOR							/		
TAH - 05178	FAN & MOTOR BEARING							/		
VA - 05179	VIBRATION OF GAS FAN 310-212-0230							/		
AH - 05180	WINDING OF GAS FAN MOTOR							/		
AH - 05181	FAN & MOTOR BEARING							/		

OUTOKUMPU OY
ENGINEERING DIVISION
ESPOO FINLAND

Client: FFCL INDIA

Project: FLASH COMPLEX AND SULPHUR BOARD

Designed | Checked | Approved

Drawing title: INSTRUMENT LOOP NO SCHEDULE

Drawing No. 360 FHA 163 001

Rev. No

Area 06 SULPHUR HANDLING

Function

Instr. diagram No

Loop No	Service	Indication	Recording	Intergration	Hand control	Set-point	Control	Alarm	Interlocking	Notes
FT 06101	FEED WATER FOR SULPHUR BURNING BOILERS	/								
FIQ 06102	STEAM OF SULPHUR BURNING BOILERS	/		/						
LIC 06103	DRUM LEVEL OF BOILER 1	/					/			
LIC 06104	DRUM LEVEL OF BOILER 2	/					/			
LIC 06105	DRUM LEVEL OF BOILER 3	/					/			
FIC 06106	STEAM FLOW OF SULPHUR COOL BOILERS	/					/			
LIC 06107	LEVEL OF SULPHUR PUMP TANK 320-518-0200	/					/	/		
LIC 06108	LEVEL OF SULPHUR PUMP TANK 320-518-0300	/					/	/		
LIC 06109	LEVEL OF SULPHUR CIRCULATION TANK	/					/	/		
LIA 06110	LEVEL OF SULPHUR TANK 320-518-0100	/						/		
LIC 06111	LEVEL OF SULPHUR PUMP TANK 320-518-500	/					/			
TE 06112.1-12	TEMPERATURES OF MOLTEN SULPHUR									
HS 06113	CHARGING / DISCHARGING OF SULPHUR HEAT TANKS			/			○			LOCAL CONTROL LOGIC
LIC 06114	LEVEL OF PUMP TANK 320 518-0600	/					/			
LIA 06115	SULPHUR DAY TANK 320-518-0200	/						/		
LIA 06116	" "	/						/		
LIC 06117	LEVEL OF PUMP TANK 320-518-0400	/					/			
FIQ 06118	PRIMARY SULPHUR ADDITION	/		/						
WIQ 06119	WEIGHING BRIDGE FOR VEHICLES	/		/						
LIA 06120	LIME BIN							/		
LIA 06121	MIXING TANK							/		
LIA 06122	SULPHONIC ACID TANK	/						/		
FIQ 06123	SULPHONIC ACID CONSUMPTION	/		/						
PIC 06124	PH CONTROL AT REACTOR TANK	/					/	/		
LIC 06125	LEVEL OF UNDERFLOW PUMP TANK	/					/	/		
LIC 06126	LEVEL OF OVERFLOW PUMP TANK	/					/	/		

4.5
Civil Works

4.5.1
Description of Buildings

Buildings on the plant

1. Office and control building, electrical rooms included

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

2. Smelter building

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

3. Power plant

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

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

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

4. Compressed air station (compressor room)

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

5. Oxygen plant

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

6. Demineralized water plant

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

7. Lime stone slurry preparation plant

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

8. Lime storage

- size appr. 5 x 5 x5 m i.e. 125 m^3
- steel frame construction with asbestos roofing

9. Power receiving station

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

10. Other

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

Pipe racks are covered, too.

Excavation

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

Foundations

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

Big equipment foundations include roughly the following items:

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

Frame structures

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

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

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

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

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

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

Walls

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

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

Partition walls will mainly be of bricks.

Roof slabs

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

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

Platforms

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

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

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

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

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

Floors

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

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

Plasterworks and other finishings

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

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

Ventilation	Natural ventilation will be used as general ventilation in the plant buildings. Compensation air will be taken through louvres provided with blocking device installed in walls, or the lower part of walls will be open (smelter building). The exhaust will be made by means of exhaust units on the roof. These exhaust units will be provided with wind protection and rain shelter. The office and cotrol room building will be provided with mechanical ventilation. These areas will be kept in over-pressure compared to surrounding areas. Electric rooms will also be provided with mechanical ventilation and will be kept in over-pressure. Inlet air will be filtered.
Out-door tanks	The cooling water pump tanks will be made of water tight concrete.

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

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

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

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

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

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

Material amounts needed

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

4.6 WATER SUPPLY

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

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

Flow no	Description
1.	Filtered raw water from the river Sone at 2 km distance.
2.	Filtered raw water from the surface water tank to different handling plants and consumption points.
3.	Semi-soft water, i.e. ion exchanged and partially chemically treated water, to cooling circulation water system as make-up water.
4.	Cooling circulation water (secondary cooling) to be used for: - secondary cooling of flash smelter furnace jacket cooling water circulation - oxygen plant cooling - turbine steam condenser and 1.7 bar boiler feed water cooler at power plant - make-up water for flash smelting furnace reaction shaft spray cooling - compressor cooling at compressed air station - sealing water for pumps all over the plant
5.	Refur of the cooling water of item 4, above
6.	Filtered raw water to overflow pump tank item 240-518-0100 in smelter
7.	Filtered raw water return from: - smelter thickener, item 240-532-0100, overflow - sulphur plant absorption tower circulation

8. Tailing pond overflow circulation to absorption tower lime stone slurry mixing tank and scrubber inlet pipe in sulphur plant.

9. Demineralized water to

   - power plant feed water tank
   - smelter FSF jacket cooling (primary circulation) as make-up water

10. Blow-down water from boilers

11. Scrubber outlet water from sulphur plant to lime stone slurry preparation plant

12. Lime stone slurry to absorption tower in sulphur plant (5-6 % of solids)

13. Potable water to different consuming points

4.7

SULPHUR RECOVERY PLANT - ~~22,250~~ 228000 TPA
(OUTOKUMPU PROCESS)
OFFSITE FACILITIES

1. LAND, LAND DEVELOPMENT ROADS AND DRAINS

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

2. Water Supply System

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

3. D.M. Water Plant

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

4. Water Softening Plant

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

5. Cooling Tower System

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

6. Fuel Oil Supply

The requirement of fuel oil is as follows :

- Light fuel oil : 1.30 TPD
- Heavy fuel oil (LSHS) : ~~40.00~~ 60.00 TPD

Outokumpu correction

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

Outokumpu correction

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

7. Sulphuric Acid Storage Tank

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

8. Pyrites Supply

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

9. Coal Supply

Outokumpu correction

The requirement of coal is ~~550~~ 575 TPD (~~478~~ 506 TPD in ~~smaller~~ Smelter plant and 72 TPD in power plant). The coal will be stored in an open yard, with fencing 70 M x 38 M (located near the railway siding) which will be sufficient to store coal of 15 days' requirement. Coal is transported to site by rail wagons. A wagon tippler cum conveyor system is provided for transferring the coal to the storage yard. Coal will be delivered to the coal feed hopper of the battery limit plant by means of a pay loader.

10. Lime Stone Storage and Slurry preparation

Outokumpu correction

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

11. Lime Storage

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

12. Power Receiving Station

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

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

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

Outokumpu correction

13. Sulphur Storage

The yearly production of sulphur is ~~221250~~ 228000 tonnes at 100% rated capacity of the plant. It is proposed to have a storage of about 1 month's production for the product sulphur. The product will be stored in open with a retaining wall around an area of 100 M x 40 M with concrete flooring provided for this purpose. 2 Conveyors of 40 M length have been provided in the battery limit plant for transporting product sulphur outside the prilling section. It is assumed that these conveyors can transport sulphur to the storage. Further another 80 M long conveyor is provided in the battery limit plant to transport sulphur upto the railway siding. This conveyor will be able to transfer the sulphur from storage to railway wagons. Hence no additional conveyors have been provided at sulphur storage area.

14. Workshop

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

15. Chemical Laboratory

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

16. Wash and Change

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

17. Material Handling - Pay Loaders

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

18. Transport Vehicles

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

19. Fire Fighting Equipment

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

20. Township

A total of 40 dwellings of average 70 M^2 area have been additionally provided in the existing PPCL Township at Anjhore for catering to the proposed sulphur plant.

Addition to FEDO-specification for
offsite facilities

21. Tailing Ponds

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

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

फैक्ट इंजनियरिंग एण्ड डिज़ाइन ऑर्गनिसेशन
FACT ENGINEERING AND DESIGN ORGANISATION

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

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

Off-site Facilities

		(Rs. lakhs)	
1.	Land, land development, roads and drains	15.00	
2.	Water Supply System	153.02	
3.	D.M. Water Plant	23.00	
4.	Water Softening Plant	21.03	
5.	Cooling tower system	~~223.91~~	173.91
6.	Fuel oil supply system	9.47	
7.	Sulphuric Acid Storage and Handling	1.40	
8.	Pyrites supply system	-	
9.	Coal supply system	55.00	
10.	Limestone storage and slurry preparation	60.09	
11.	Lime storage	0.50	
12.	Power receiving station	154.22	
13.	Sulphur storage	7.00	
14.	Mxx Workshop	10.00	
15.	Chemical laboratory	15.00	
16.	Wash and change	2.00	
17.	Material handling - pay-loaders	83.01	
18.	Transport vehicles	5.00	
19.	Fire fighting equipment	25.00	
20.	Township	50.04	
A.	TOTAL UPTO (1-20)	~~913.69~~	863.69
B.	ENGG., PROCUREMENT, PROJECT MANAGEMENT AND SITE MANAGEMENT @ 10%	~~91.37~~ 1005.06	86.37 950.06
C.	CONTINGENCIES @ 5%	~~50.25~~	~~50.25~~ 47.50
	GRAND TOTAL (A+B+C)	1050.74	1055.25 997.56
	Tailing pond		75.00
			1072.56

Ex. D. (included in above) 58.26
C.T. (— " —) 21.06

Operating Personnel (Off-sites)

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

Maintenance Personnel (Total for main plant & Offsites

1.	Fitters	16
2.	Riggers	16
3.	Helpers	48
4.	Machinists	8
5.	Leadsmen	3
6.	Electricians	8
	Total:	99

SULFUR RECOVERY PROJECT FROM AMTHORE PYRITES (PPCL)

Horse power of Offsite Machinery

	No	HP/unit	Total HP
(1) L. Fuel oil pumps	2	50	5.0
(2) H. Fuel oil pumps	3	7.5	7.5
(3) Lime stone conveyor	1	80	80
(4) Cooling tower fan	4	100.0	400.0
(5) Hot well pumps	4+1	200.0	800.0
(6) Cold well pumps	4+1	450.0	1800.0
(7) DM water pumps	1+1	50	5.0
(8) Filtered water pump(s)	1+1	200.0	200.0
(9) Soften water pump	1+1	50.0	50.0
(10) Sulfuric feed pump	1+1	1.0	1.0
(11) Wet grinding mill	1	200.0	200.0
(12) Service Water pump at River bed	2+1	200.0	200.0
(13) Jaw crusher, [illegible], Coal conveyor, [illegible], Slurry pump etc		200.0	200.0
TOTAL			3876.5

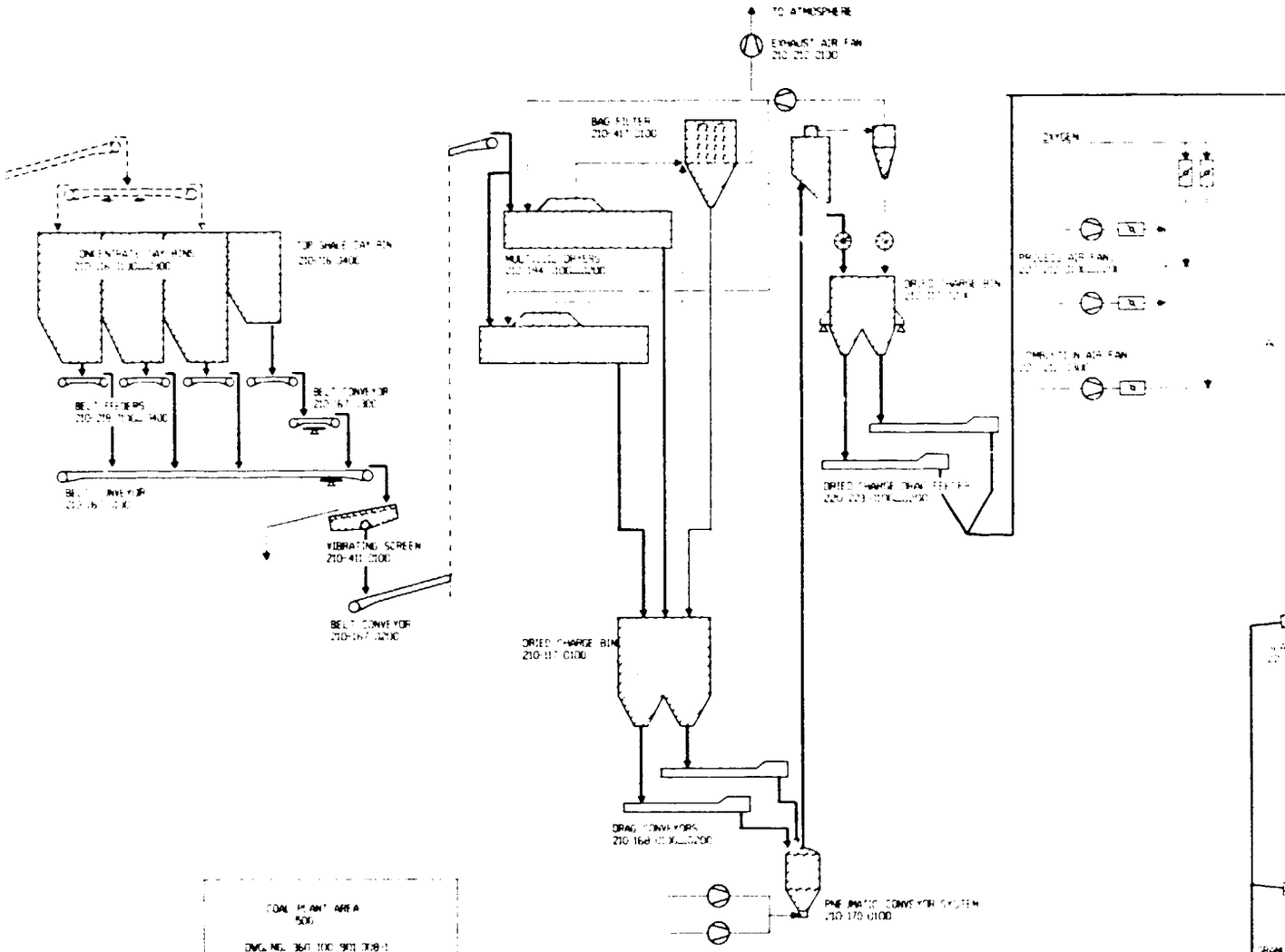
TOTAL POWER CONSUMPTION 80% of HP

$3876.5 \times 0.8 = 3101.2$ HP

$= 3101.2 \times 746 \div 1000$

$= 2313.5$ KWH

2.3 MW



COAL PLANT AREA
500

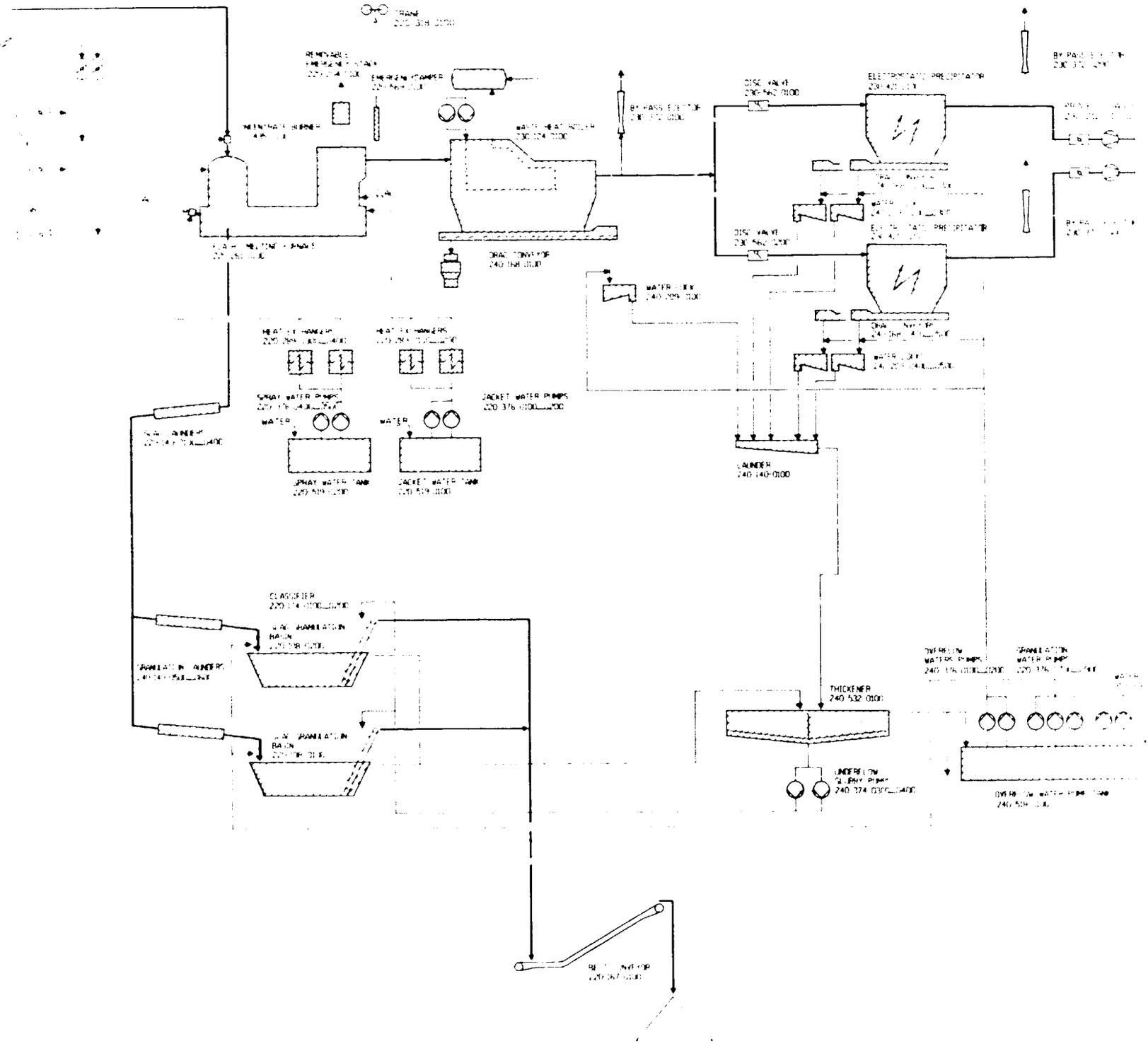
POWER PLANT AREA
600

OXYGEN PLANT AREA
700

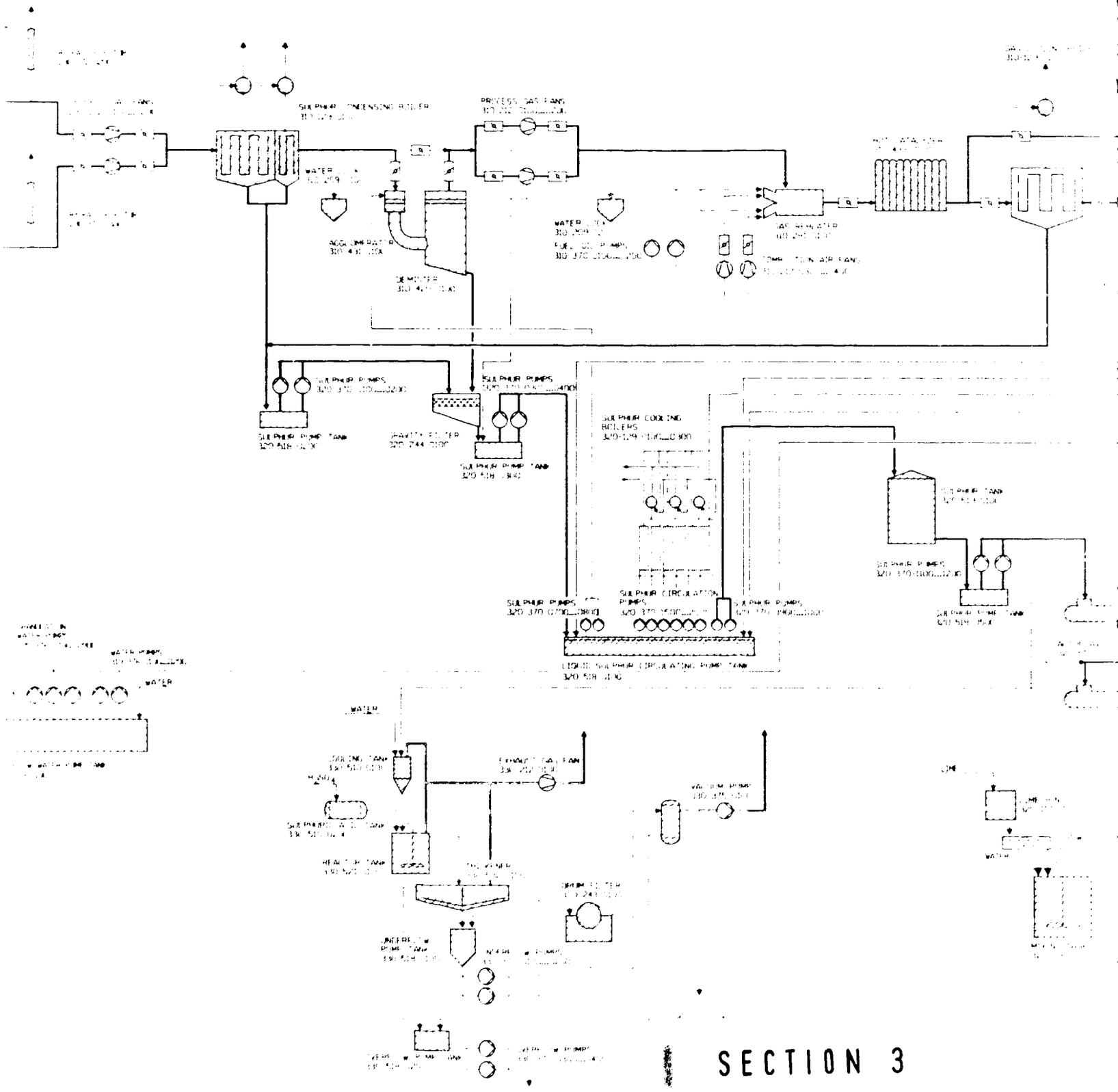
LIME STONE & DRY PREPARATION AREA
800

WATER TREATMENT PLANT AREA
900

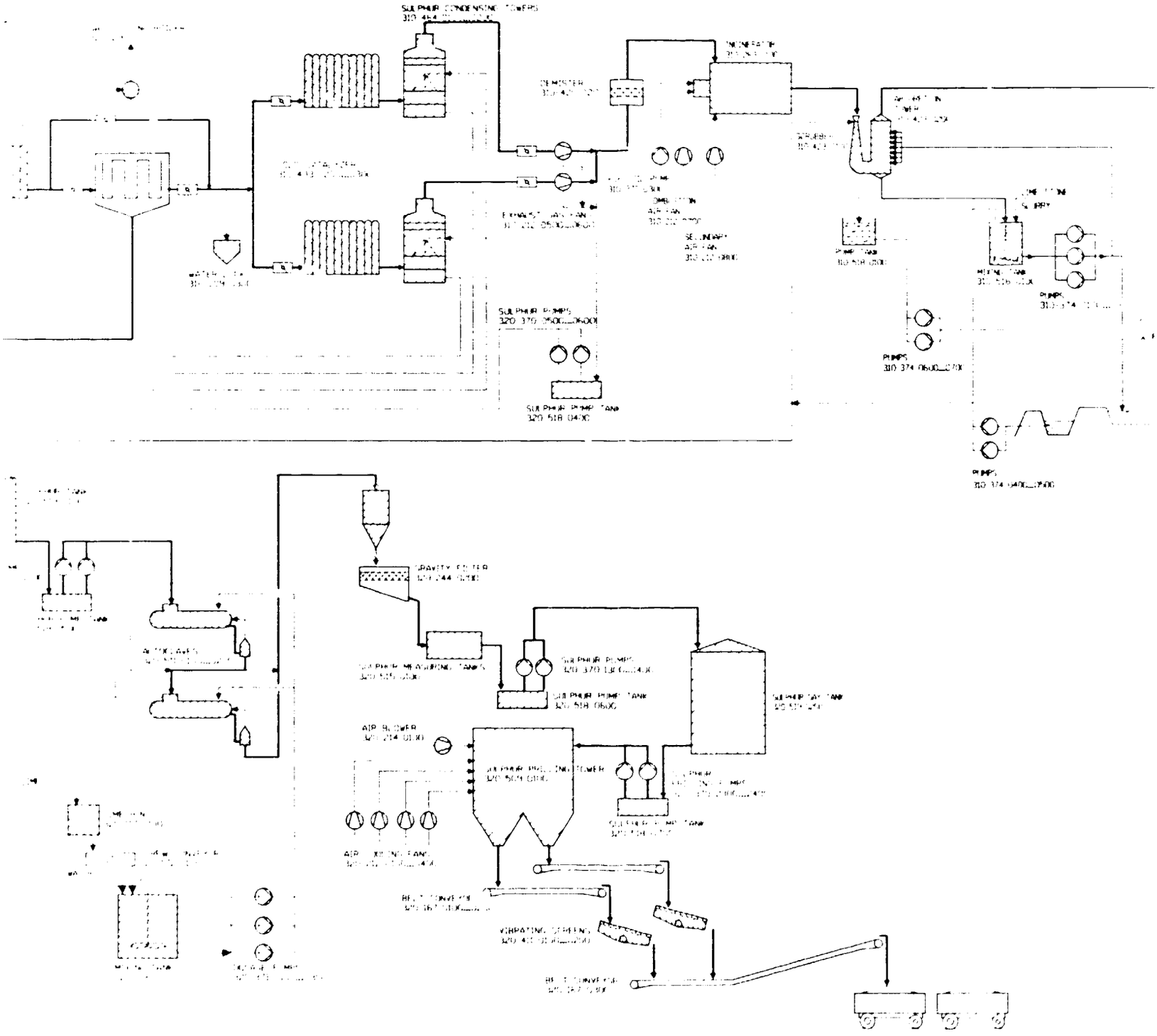
SECTION 1


DISC VALVE
ELECTROSTATIC PRECIPITATOR
BY-PASS EJECTOR
WASTE HEAT BOILER
DRAG CONVEYOR
HEATER HANGERS
SPRAY WATER PUMPS
JACKET WATER PUMPS
WATER
LAUNDER
240 140-0100
CLASSIFIER
GRANULATION BASIN
GRANULATION LAUNDERS
THICKENER
240 532 0100
UNDERFLOW SLURRY PUMP
OVERFLOW WATER PUMPS
GRANULATION WATER PUMPS

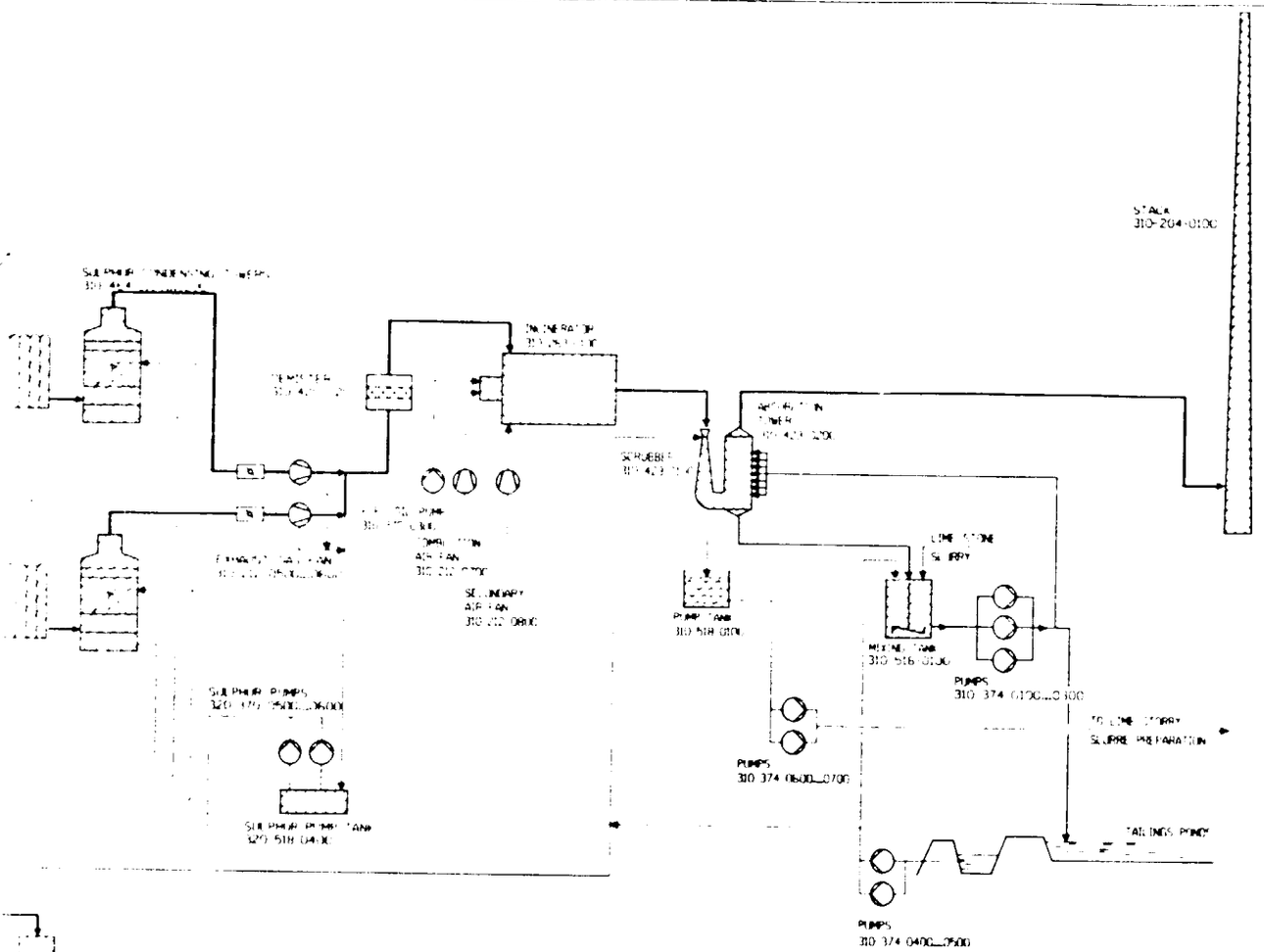
SECTION 2

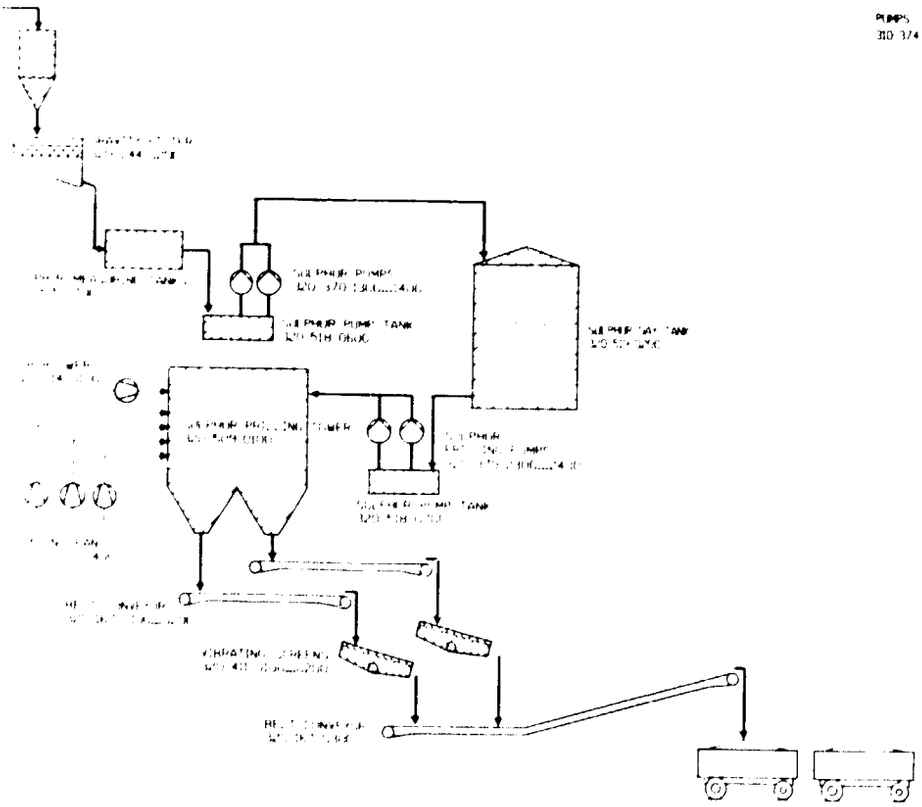

SULPHUR CONDENSING BOILER
PROCESS GAS FANS
WATER
AGGLOMERATOR
DE-MISTER
WATER
FUEL OIL PUMPS
GAS REHEATER
SULPHUR PUMPS
SULPHUR PUMP TANK
GRAVITY FILTER
SULPHUR PUMPS
SULPHUR PUMP TANK
SULPHUR COOLING BOILERS
SULPHUR PUMPS
SULPHUR CIRCULATION PUMPS
SULPHUR PUMPS
LIQUID SULPHUR CIRCULATING PUMP TANK
SULPHUR TANK
SULPHUR PUMPS
SULPHUR PUMP TANK
WATER
WATER
COOLING TOWER
EXHAUST GAS FAN
VACUUM PUMP
LIME

SECTION 3


SULPHUR CONDENSING TOWERS
DEMISTER
SULPHUR PUMPS
SULPHUR PUMP TANK
SULPHUR PUMPS
PUMPS
PUMPS
GRAVITY FILTER
SULPHUR PUMPS
SULPHUR PUMP TANK
AIR BLOWER
VIBRATING SCREENS

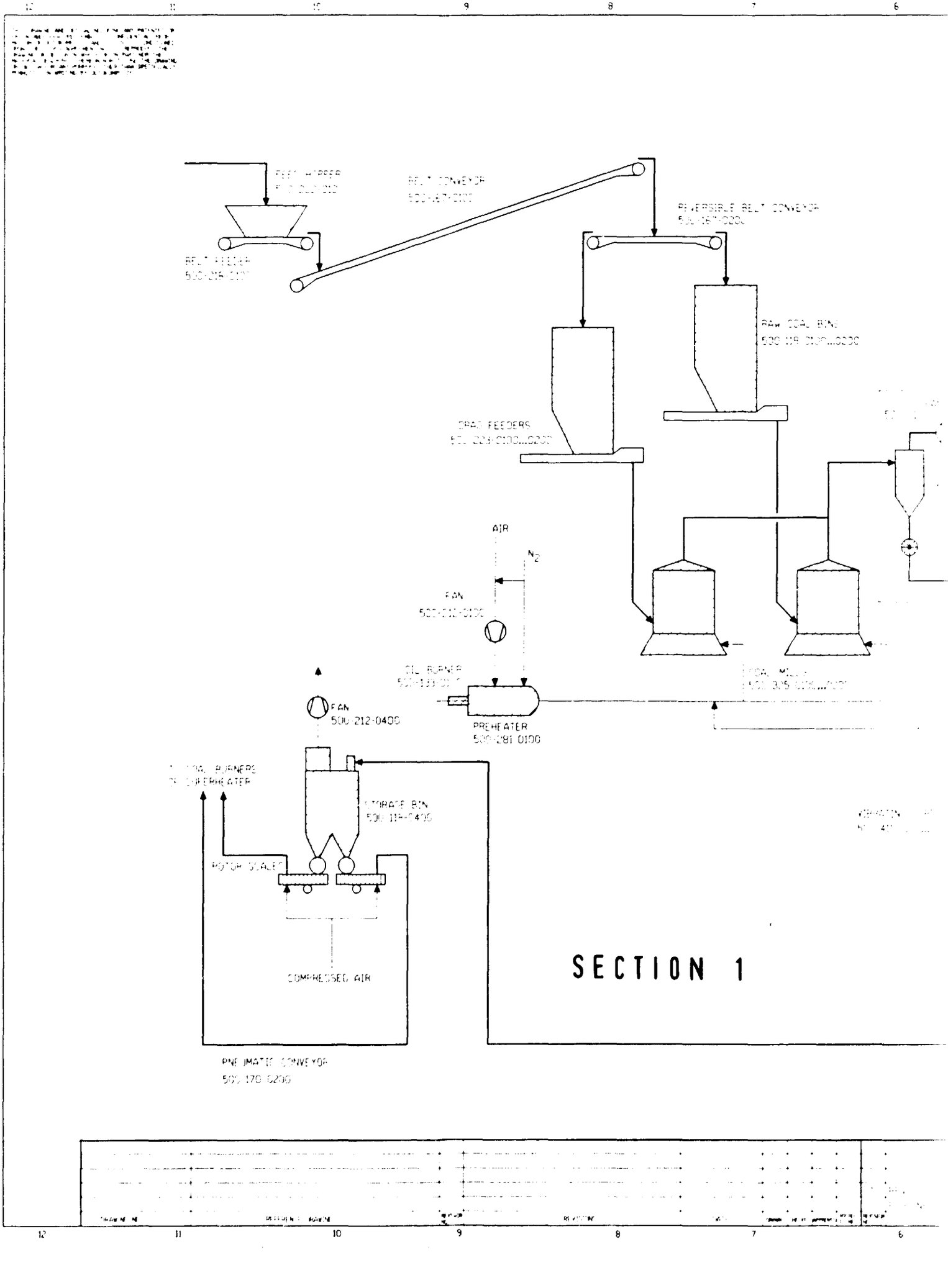
SECTION 4

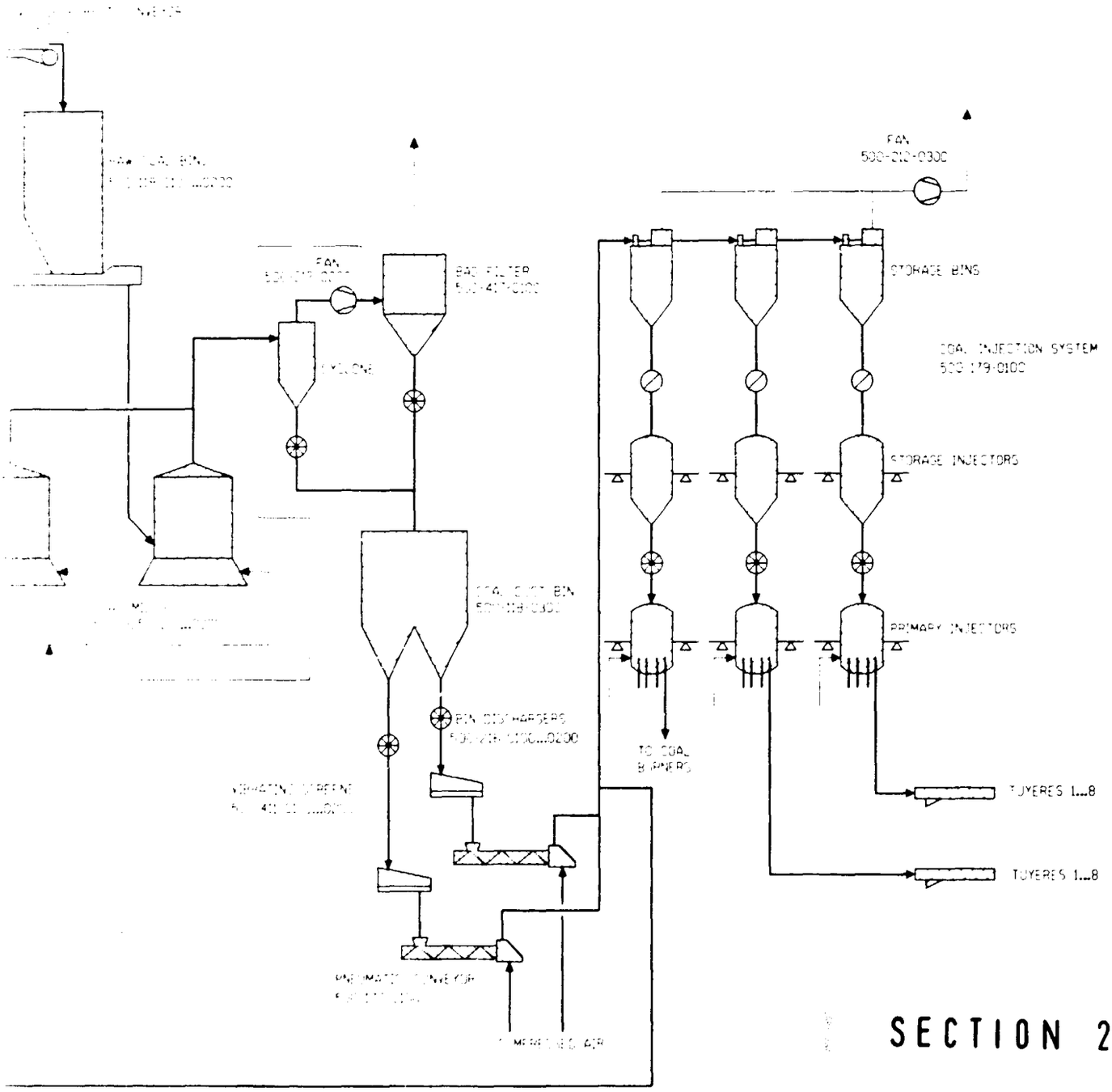




SECTION 5

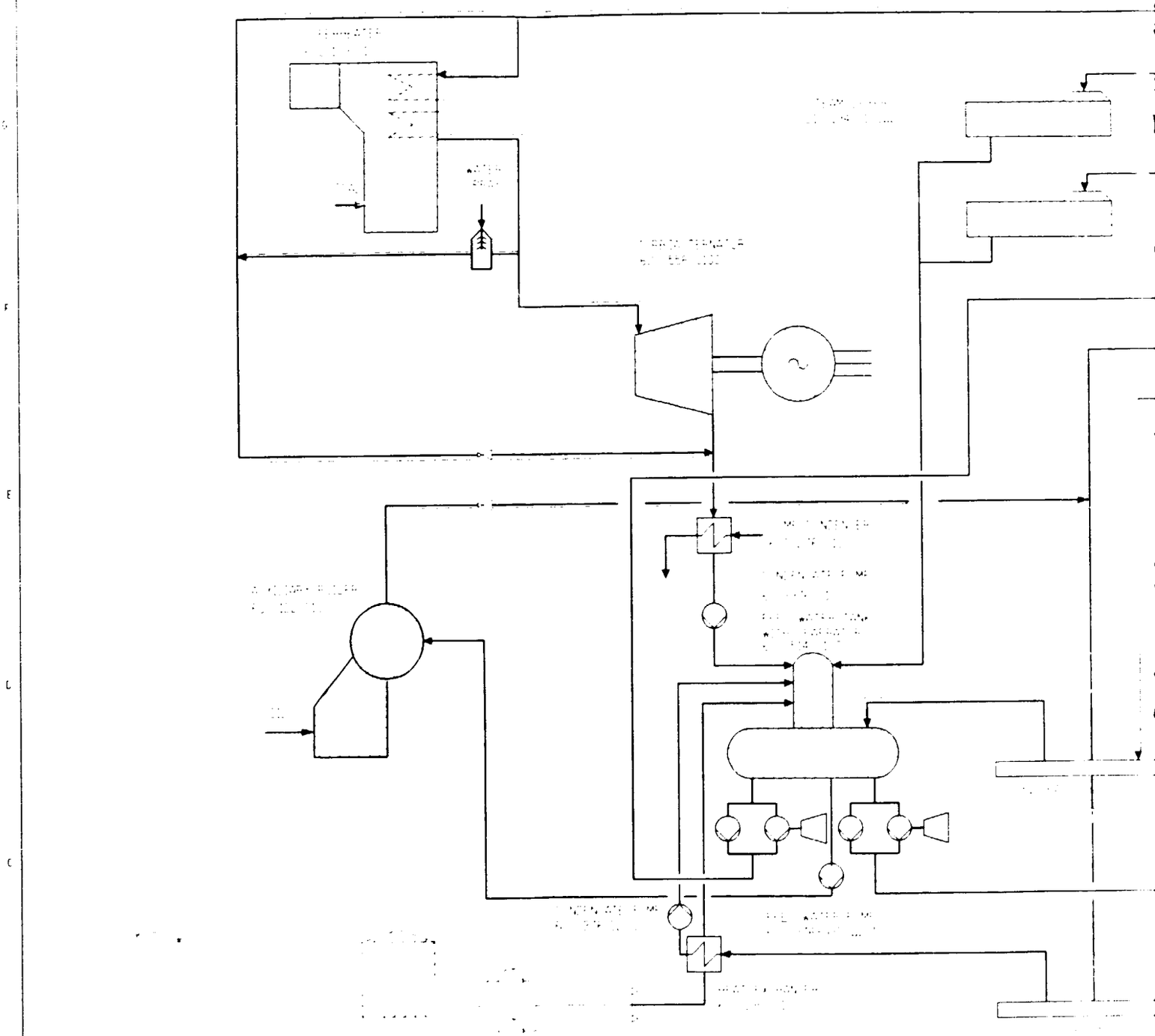
OUTOKUMPU ENGINEERING


BELT FEEDER
BELT CONVEYOR
REVERSIBLE BELT CONVEYOR
RAW COAL BINS
DRAG FEEDERS
AIR
N_2
FAN
OIL BURNER
COAL MILL
FAN
500-212-0400
PREHEATER
500-281-0100
COAL BURNERS
OF SUPERHEATER
STORAGE BIN
500-114-0400
ROTOR SCALES
COMPRESSED AIR
PNEUMATIC CONVEYOR
500-170-0200
SECTION 1

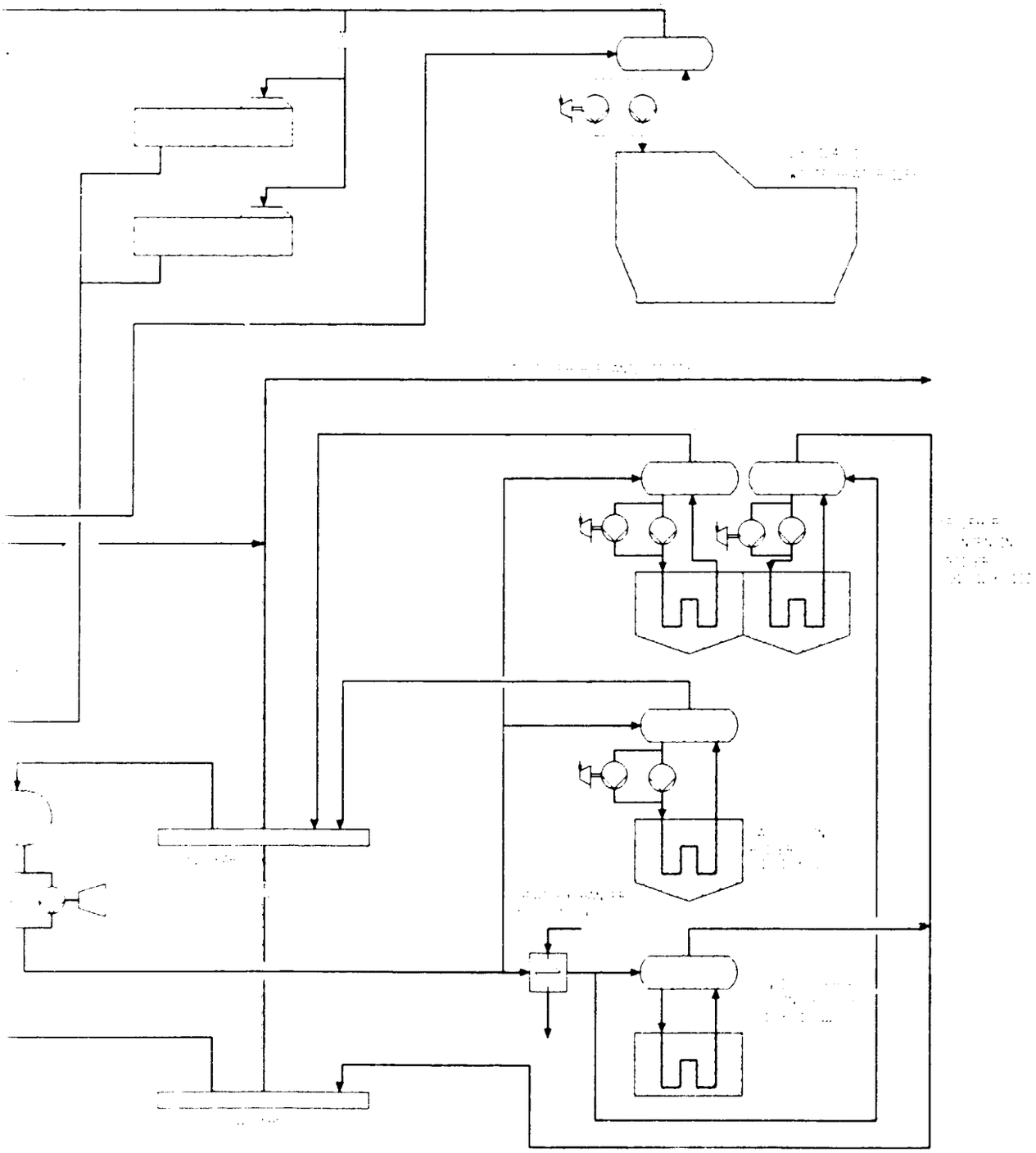


SECTION 2

OUTOKUMPU OY
ENGINEERING DIVISION

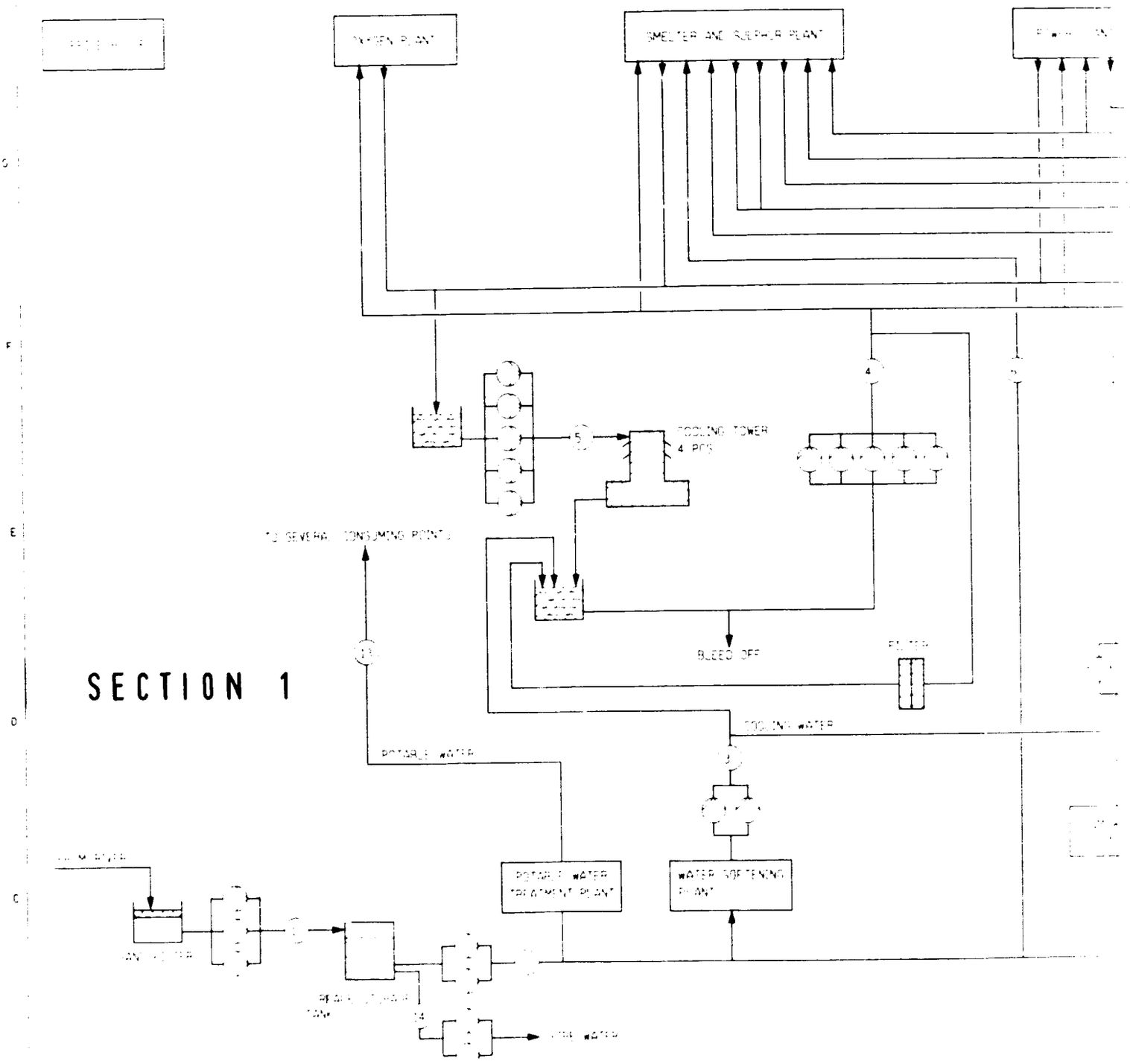


SECTION 1



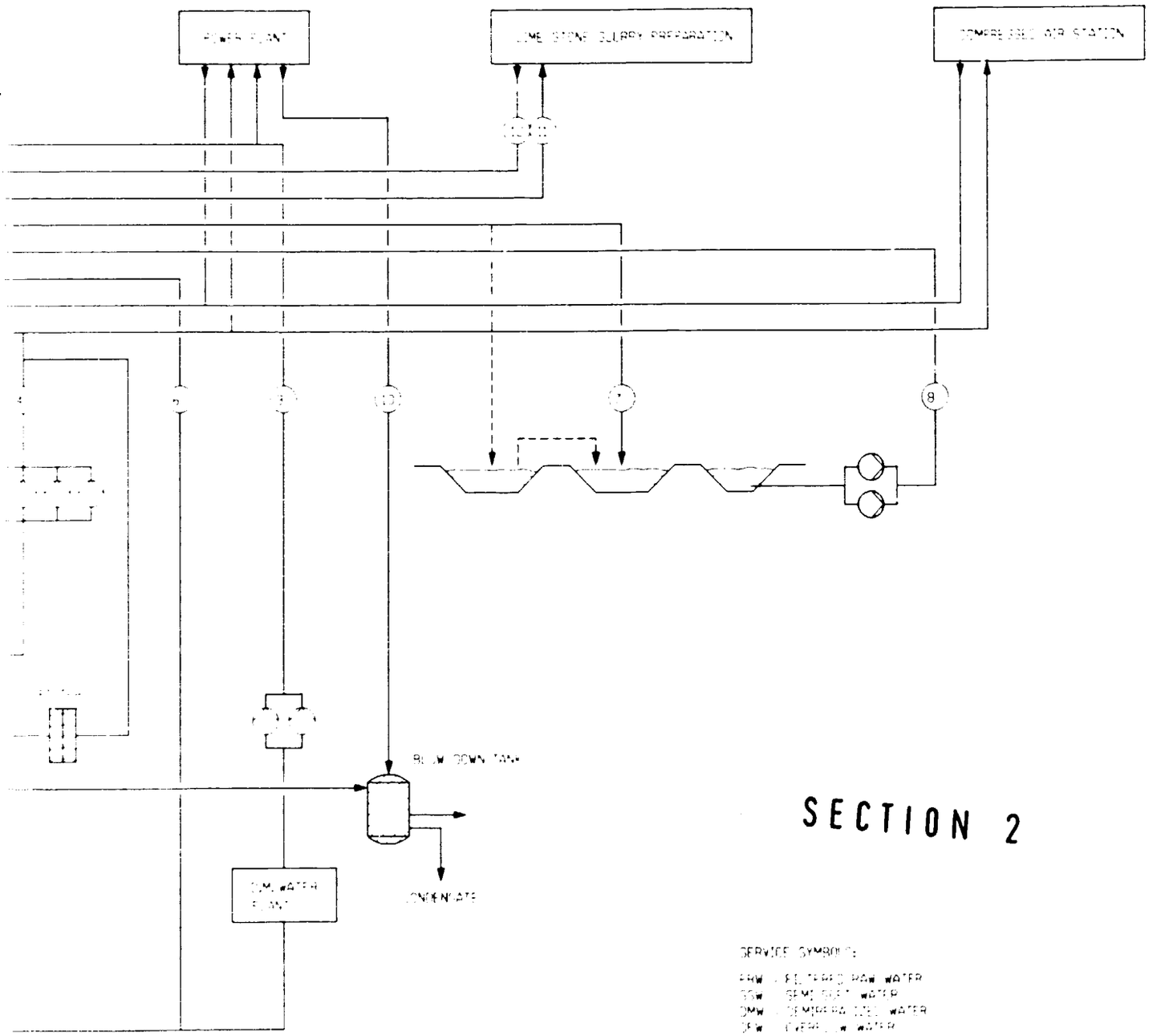
SECTION 2

OUTOKUMPU OY



SECTION 1

STREAM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SERVICE SYMBOL	FRW	FRW	SSW	SSW	SSW	FRW	FRW	OFW	OMW	OMW	SW	SW	PW	SW
FLOW DESIGN m³/h	500	500	250	1300	1900	30	290	210	20	20	290	200	5	

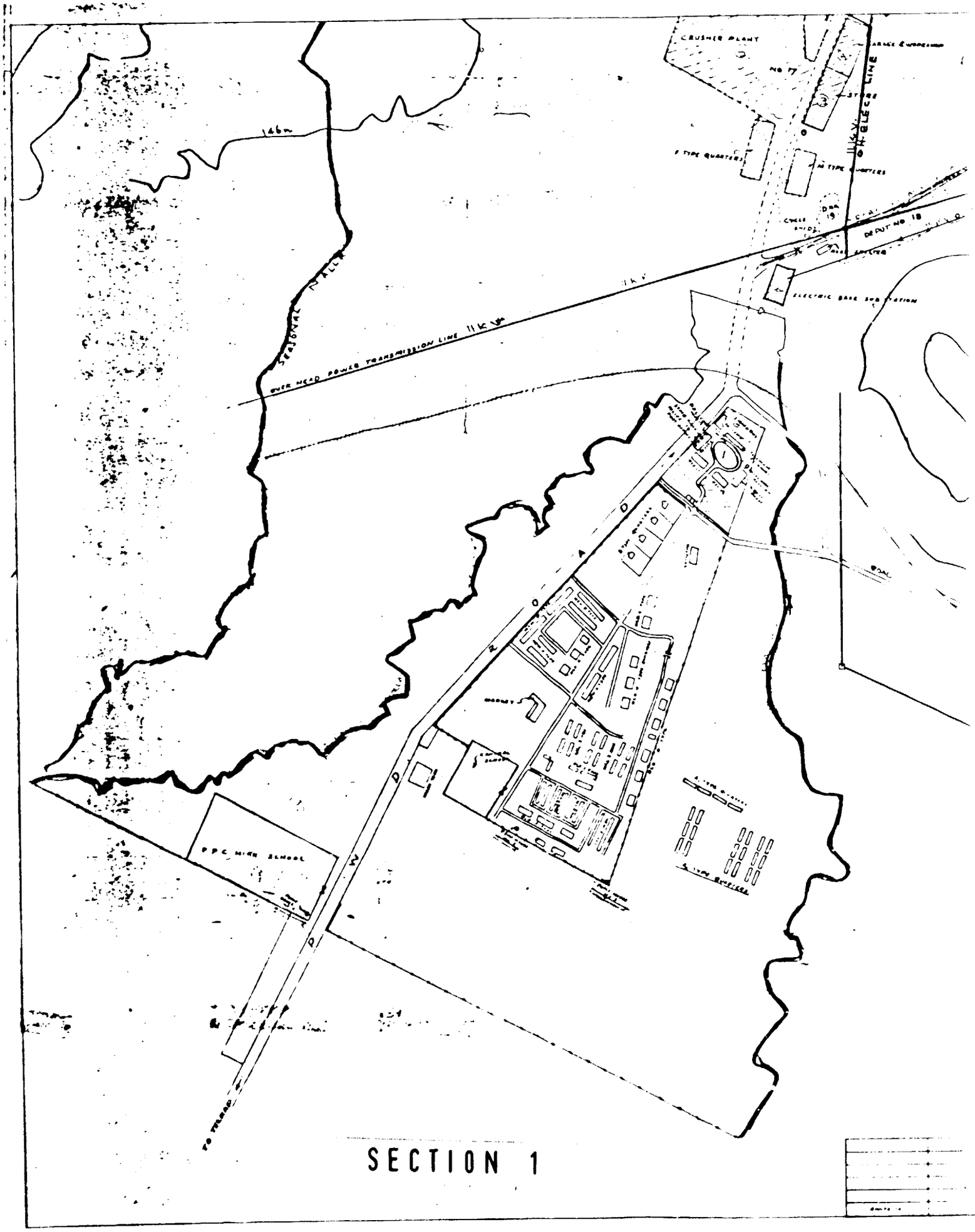


SECTION 2

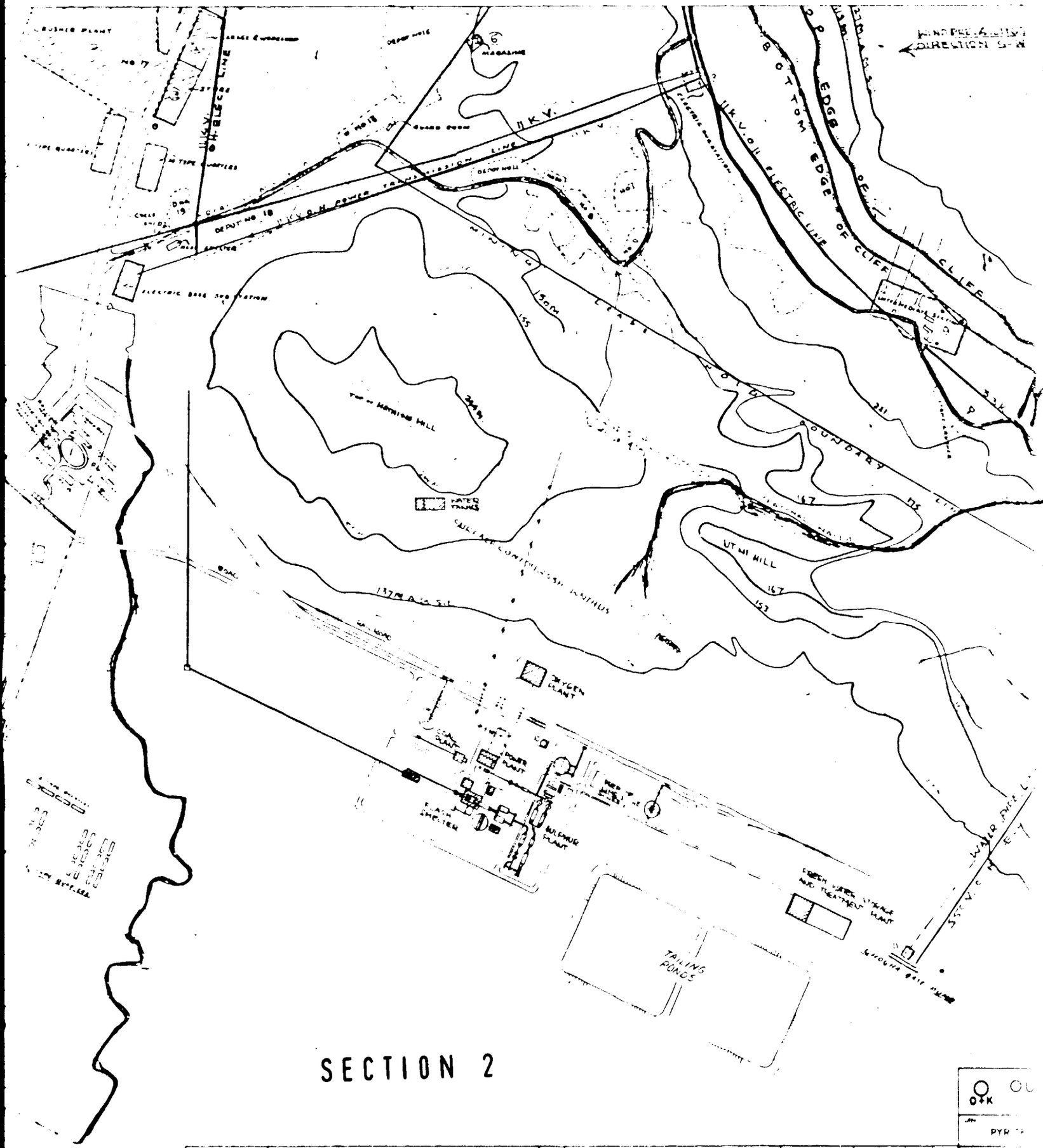
SERVICE SYMBOLS:

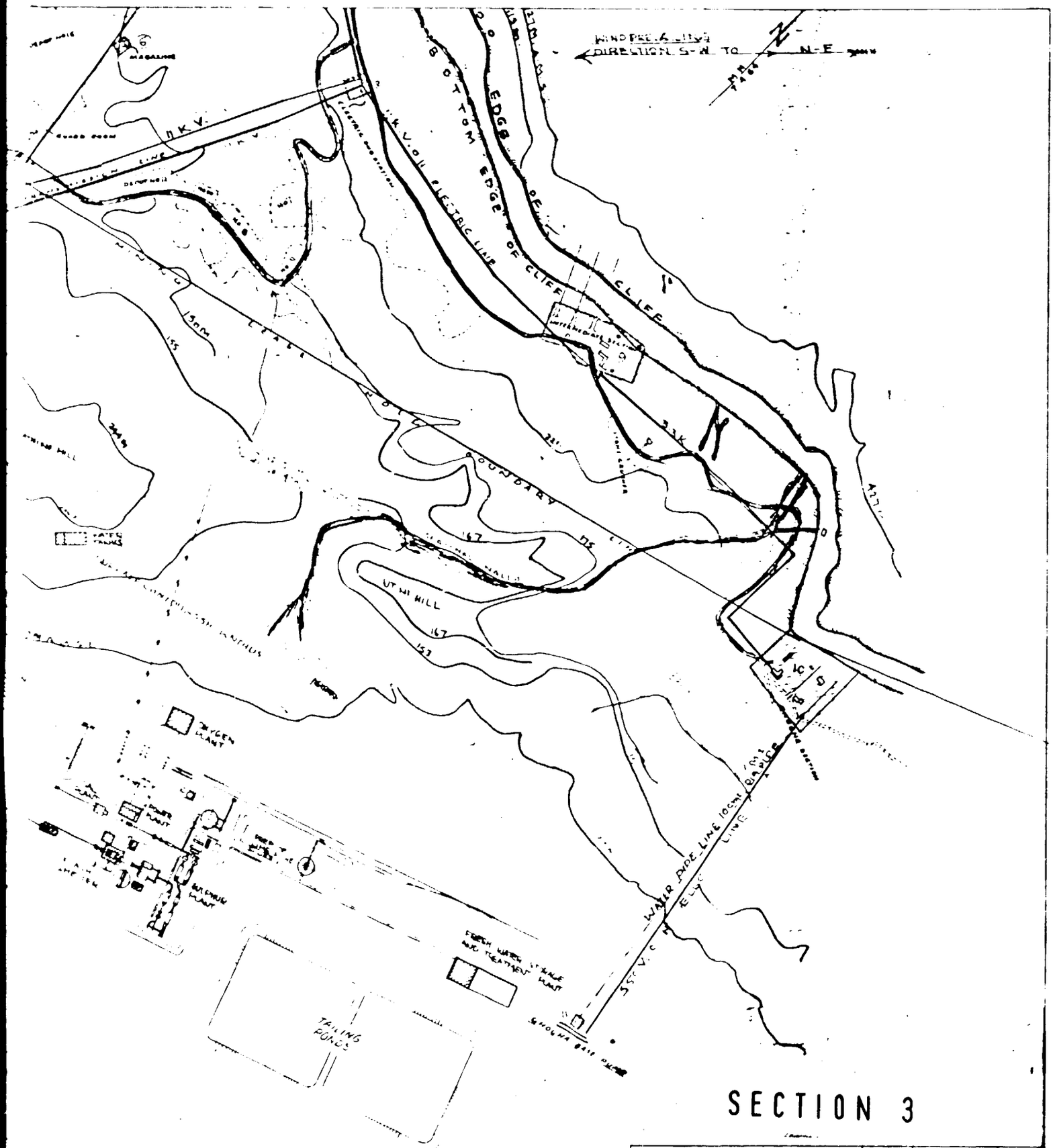
FRW - FILTERED RAW WATER
DSW - DEMINERALIZED WATER
DMW - DEMINERALIZED WATER
DFW - FEEDWATER
BW - BLOWDOWN WATER
PW - PROCESS WATER
FW - FIRE WATER

OUTOKUMPU ENGINEERING


CRUSHER PLANT
No 17
11 KV
OVER HEAD POWER TRANSMISSION LINE 11 KV
ELECTRIC BASE SUB STATION
DEPOT No 18
D.P.C. HIGH SCHOOL

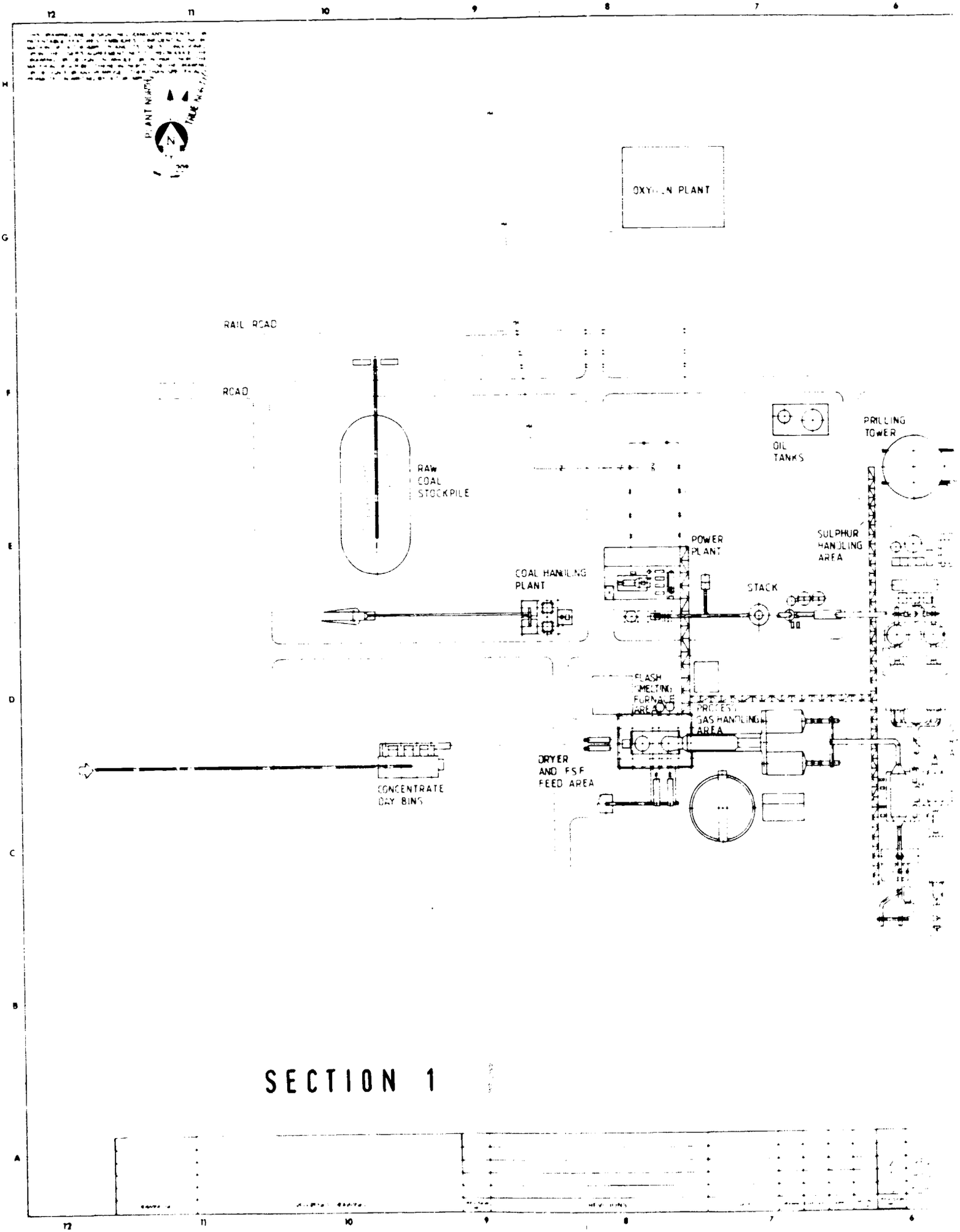
SECTION 1


11K.V. ELECTRIC LINE
11K.V.O.H. POWER TRANSMISSION LINE
DEPOT No 18
DEPOT No 19
MAGAZINE
ELECTRIC SUB STATION
BOTTOM EDGE OF CLIFF
TOP OF CLIFF
WINDPIPE ASSEMBLY DIRECTION S-N
BOUNDARY
UT MI HILL
TOP OF HARRISON HILL
WATER TANKS
OXYGEN PLANT
COAL PLANT
POWER PLANT
BLOWING PLANT
TAILINGS PONDS
SECTION 2

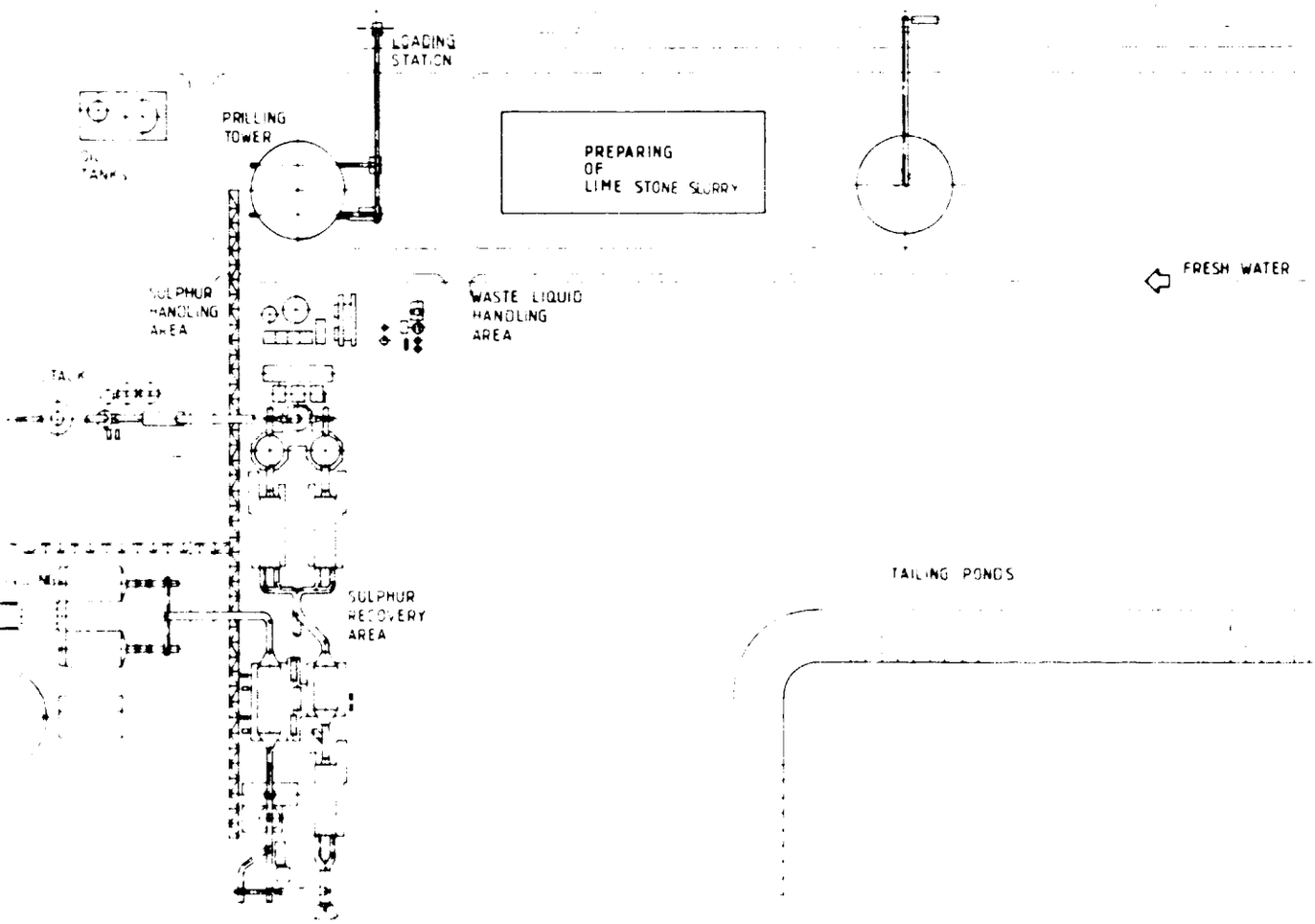


SECTION 3

OUTOKUMPU OY	27 JUNE 1984	GW
PYRITES PHOSPHATES & CHEMICALS LTD		
PROJ. PYRITE SMELTER		
FLASH SMELTER AND SULPHURIC ACID PLANT SITE PLAN	1:4000	

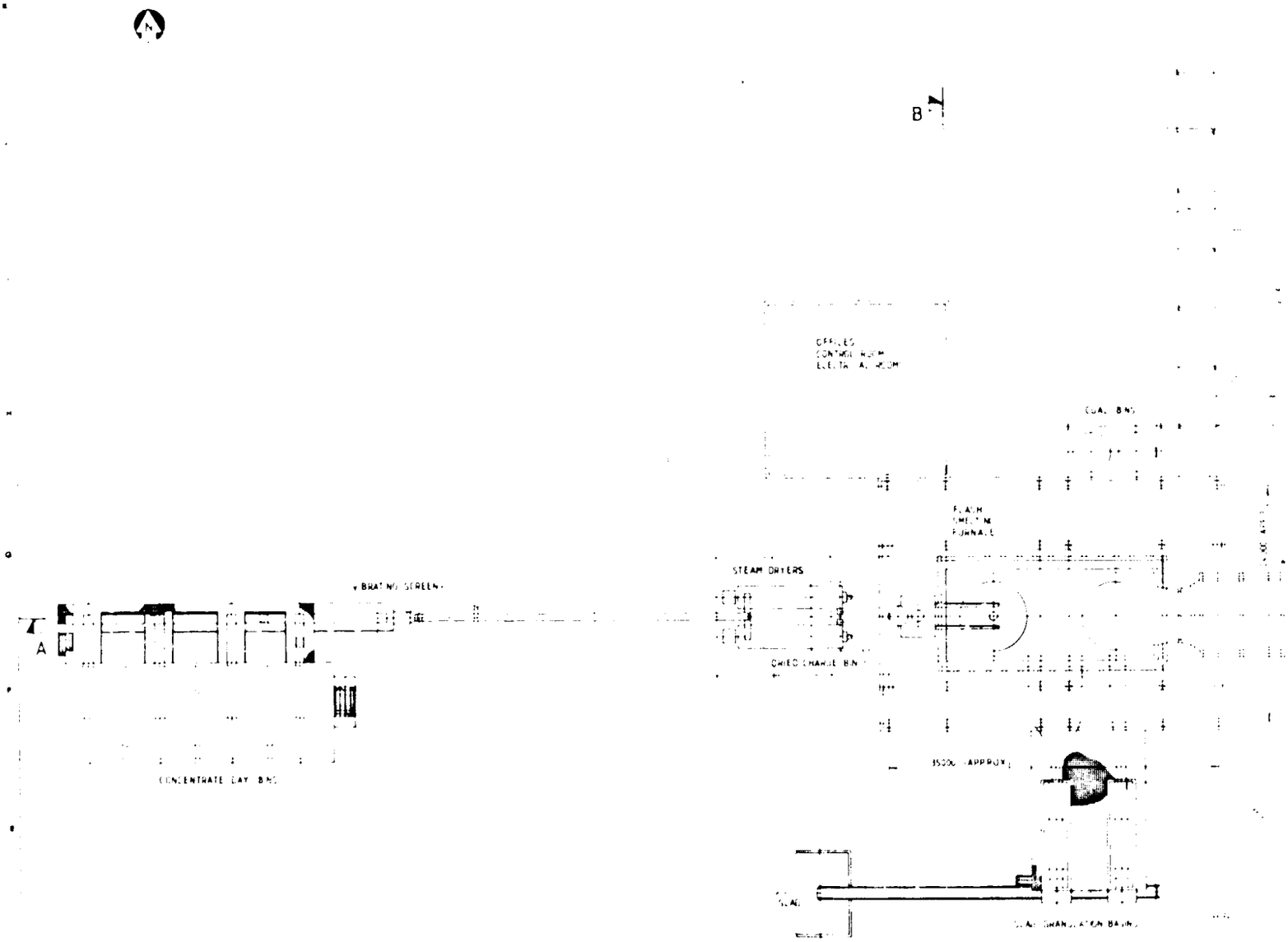

PLANT NORTH
TRUE NORTH
OXYGEN PLANT
RAIL ROAD
ROAD
RAW COAL STOCKPILE
OIL TANKS
PRILLING TOWER
POWER PLANT
SULPHUR HANDLING AREA
COAL HANDLING PLANT
STACK
FLASH SMELTING FURNACE AREA
PROCESS GAS HANDLING AREA
DRYER AND FSF FEED AREA
CONCENTRATE DAY BINS

SECTION 1

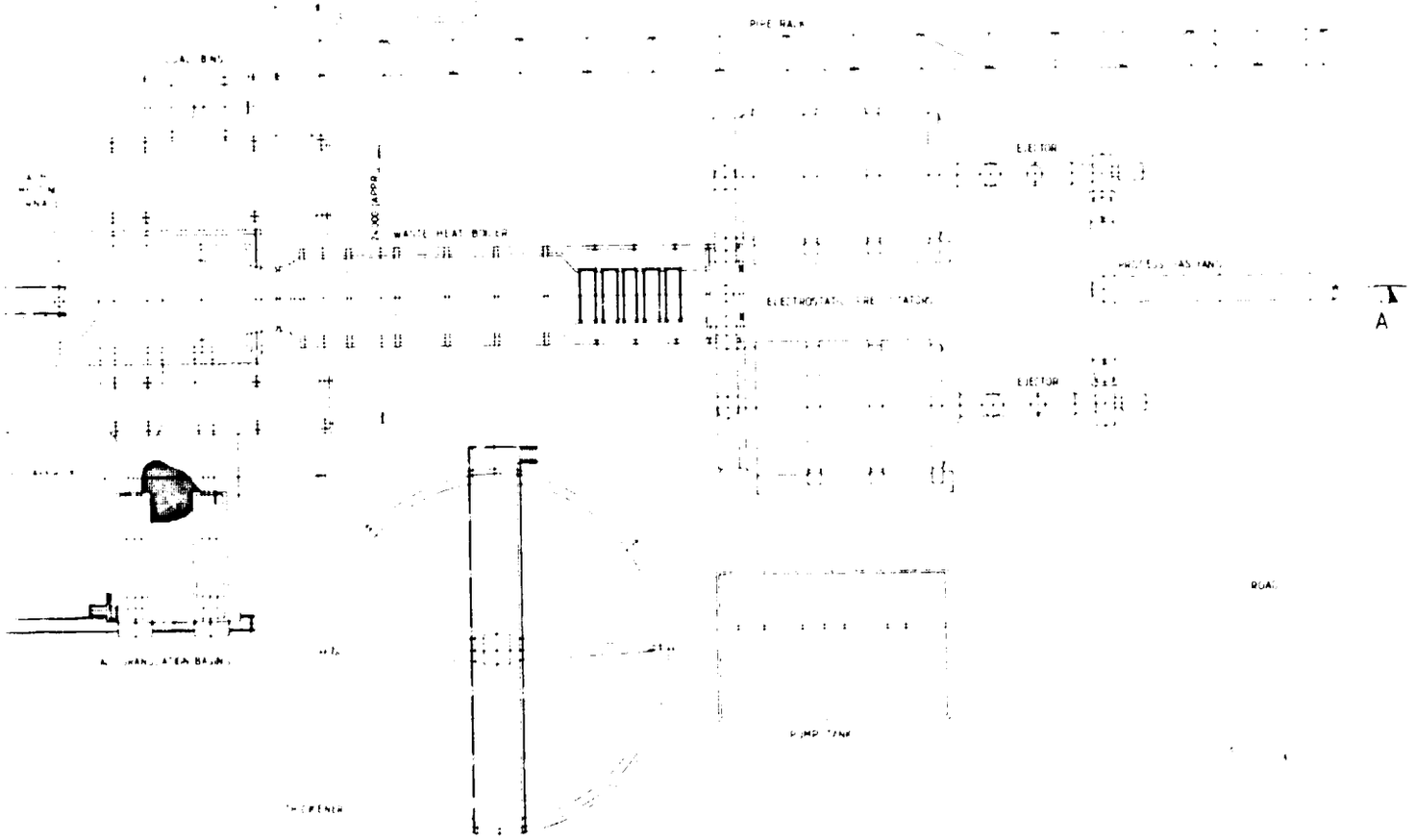


SECTION 2

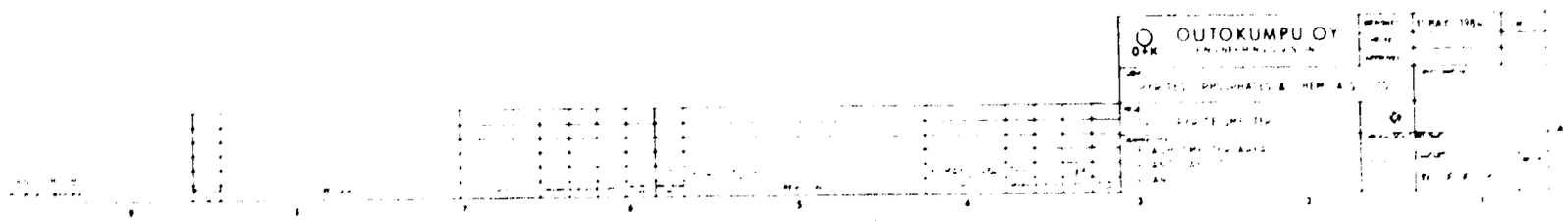
OUTOKUMPU OY
ENGINEERING DIVISION

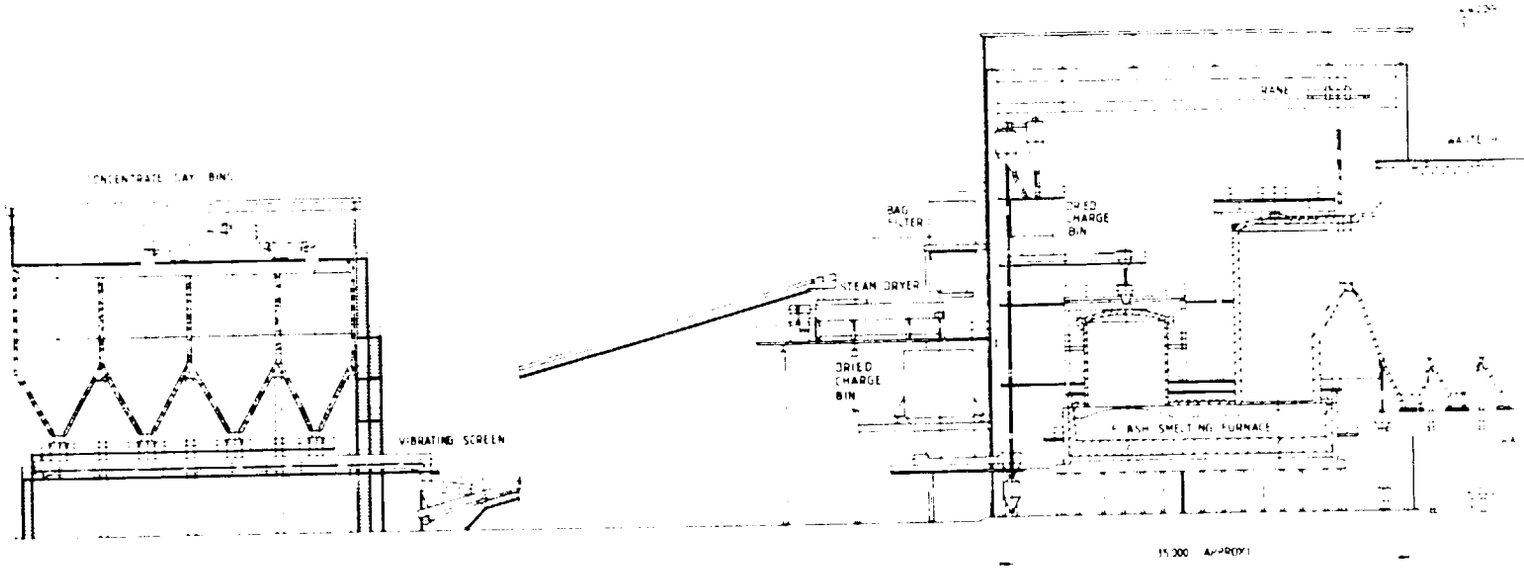

B
OFFICES
CONTROL ROOM
ELECTRICAL ROOM
COAL BINS
FLASH SMELTING FURNACE
STEAM DRYERS
VIBRATING SCREENS
A
CONCENTRATE DRY BINS
DRIED CHARGE BIN
35000 (APPROX.)
COAL
COAL GRANULATION BAINS
B

SECTION 1

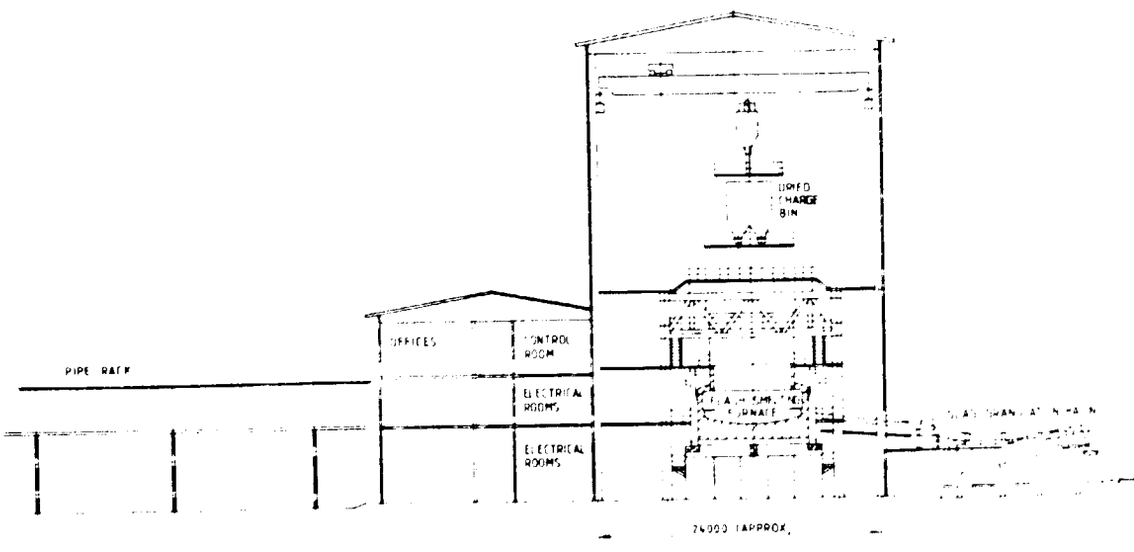

PIPE RACK
EJECTOR
WASTE HEAT BOILER
ELECTROSTATIC PRECIPITATOR
EJECTOR
A
A
ROAD
PUMP TANK
TRENCH

SECTION 2


OUTOKUMPU OY

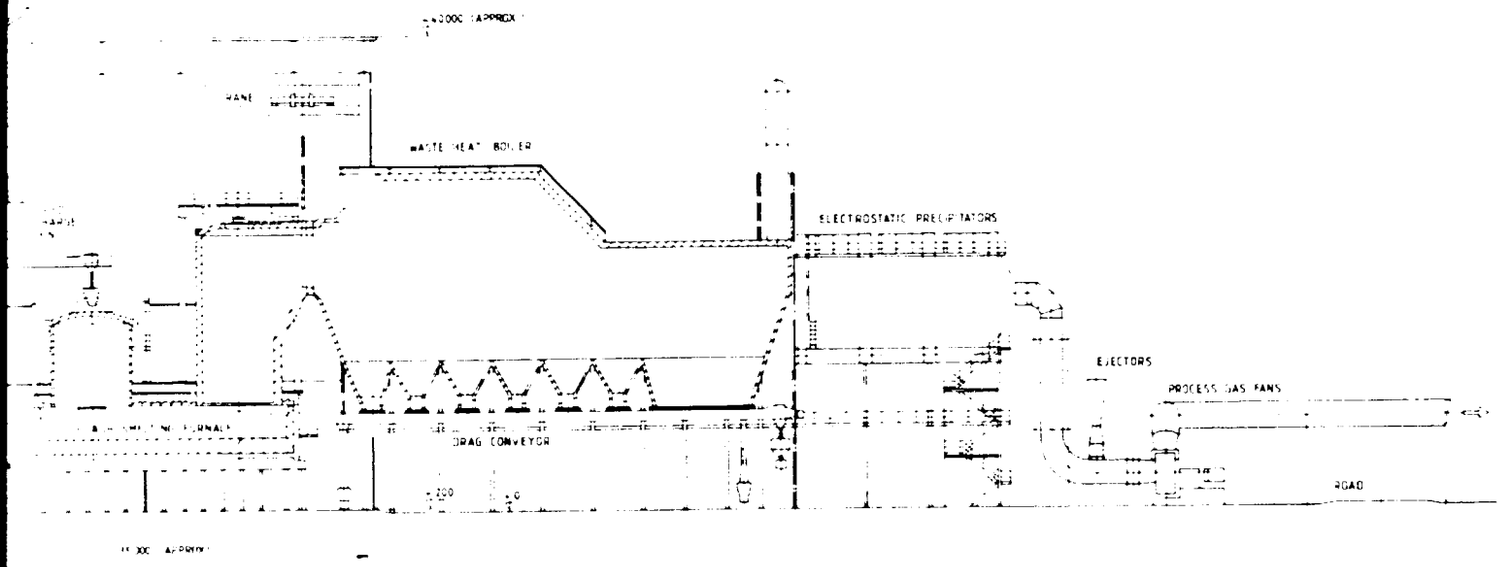


SECTION A - A

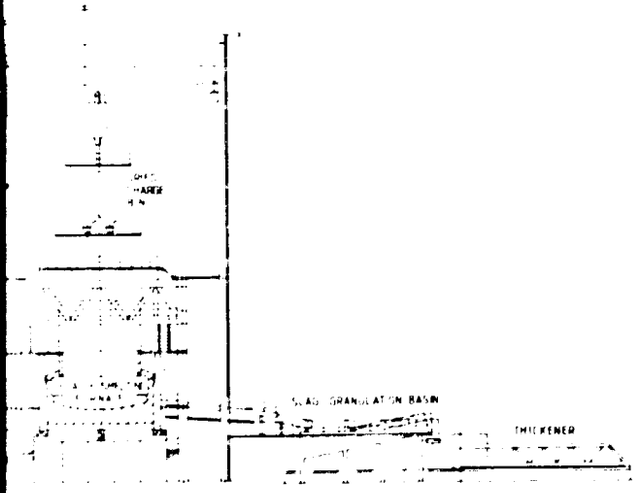


SECTION B - B

SECTION 1



SECTION A - A



SECTION B - B

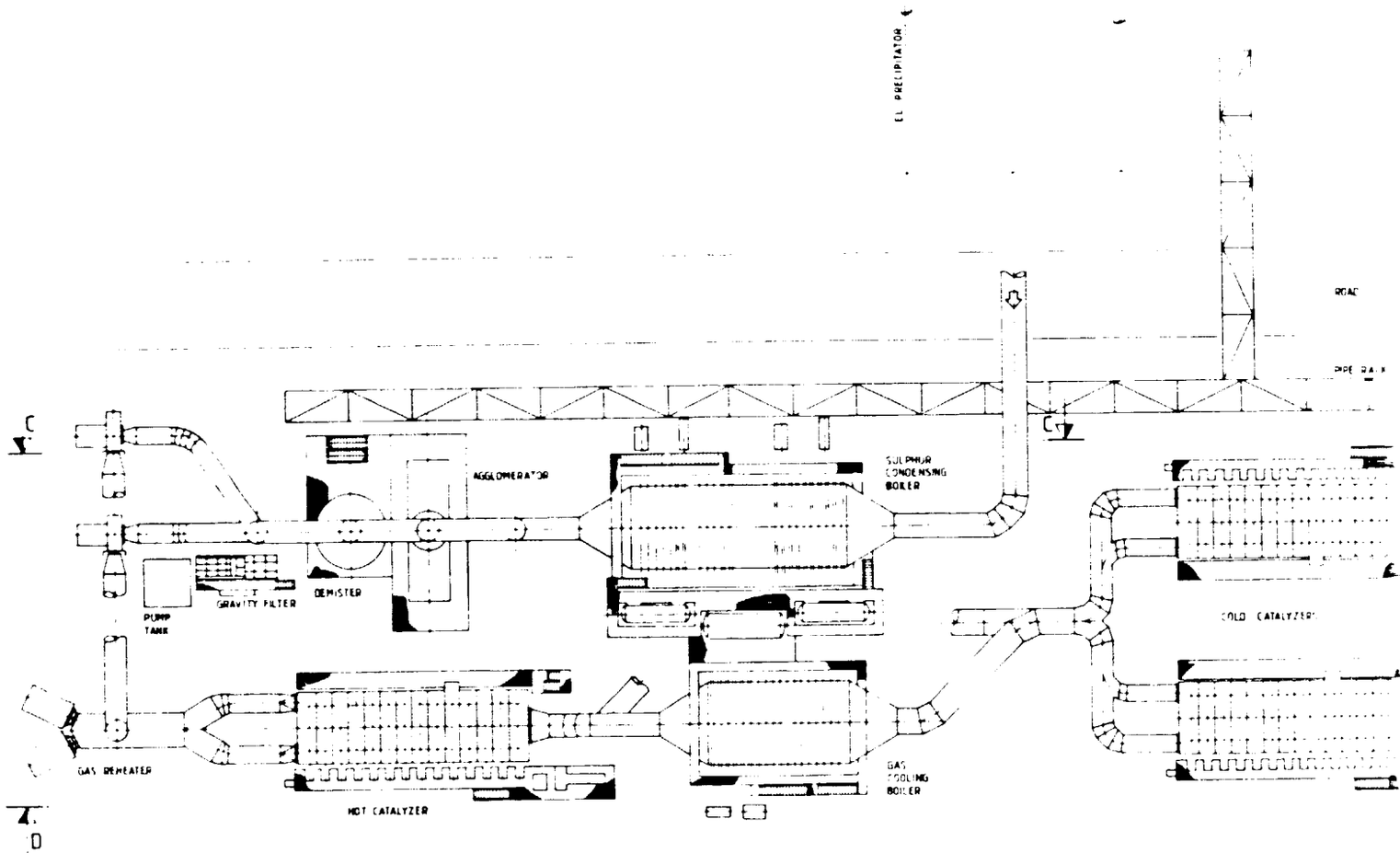
SECTION 2

OUTOKUMPU OY
ENGINEERING DIVISION

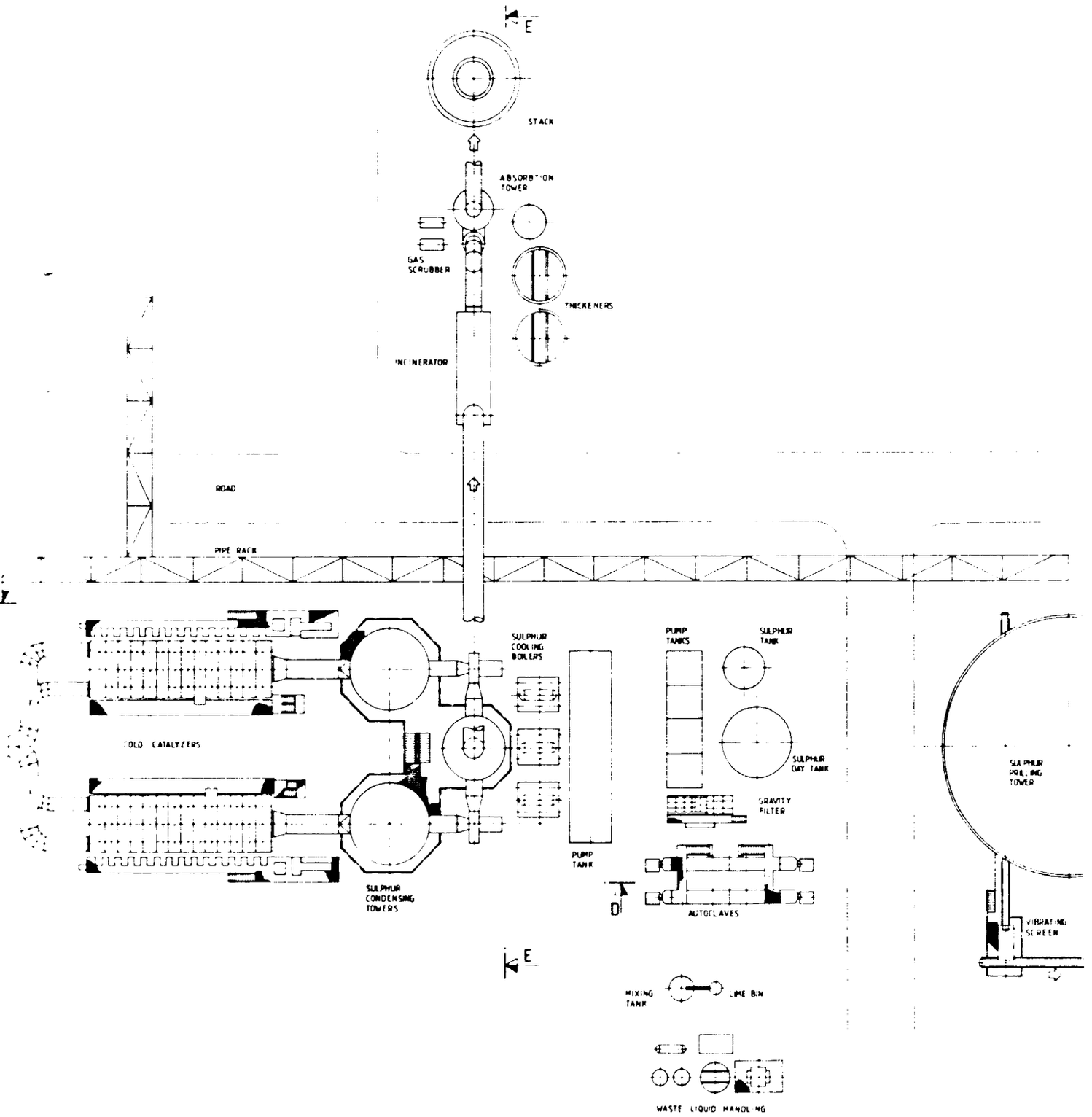
PYRITES PHOSPHATES & CHEMICALS LTD

PYRITE SMELTER

SMELTER AREA
PLAN AT +
SECTIONS A-A AND B-B


EL PRECIPITATOR
ROAD
AGGLOMERATOR
SULPHUR CONDENSING BOILER
GRAVITY FILTER
DEMISTER
PUMP TANK
COLD CATALYZER
GAS REHEATER
HOT CATALYZER
GAS COOLING BOILER

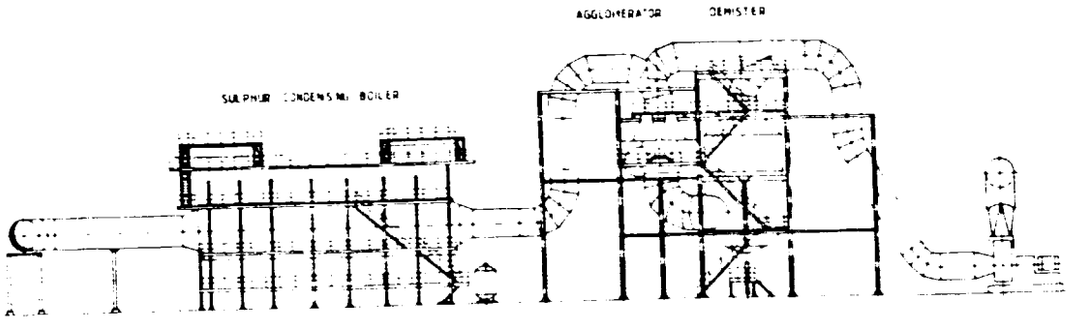
SECTION 1



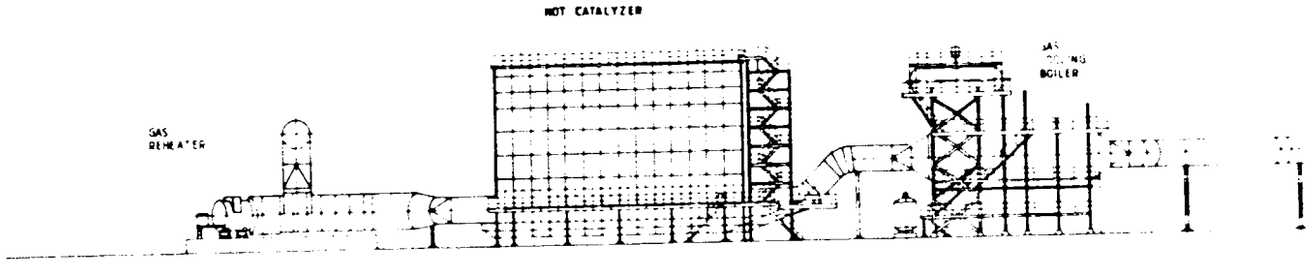
SECTION 2

OUTOKUMPU OY

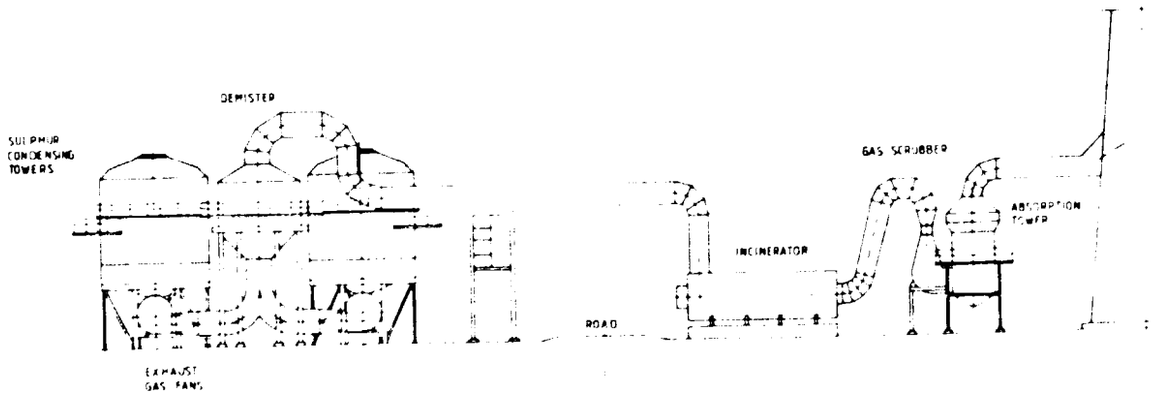
PYRITES, PHOSPHATES & CHEMICALS LTD



SECTION C-C

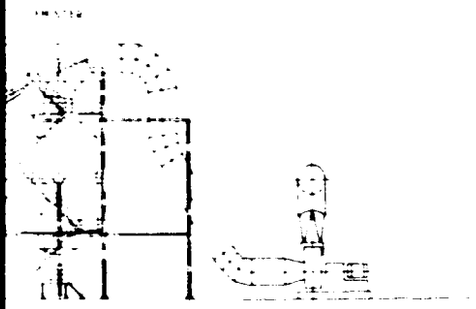


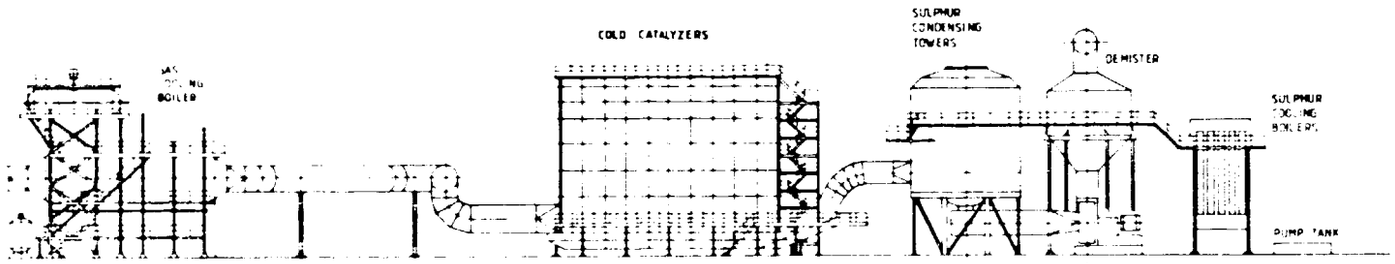
SECTION D-D

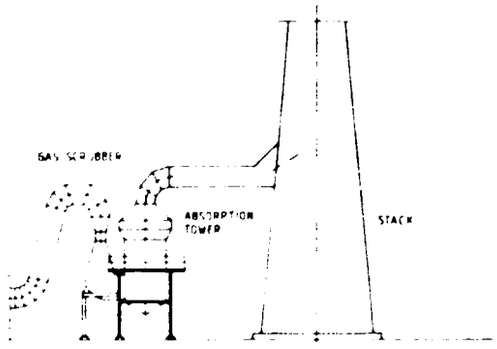


SECTION E-E

SECTION 1



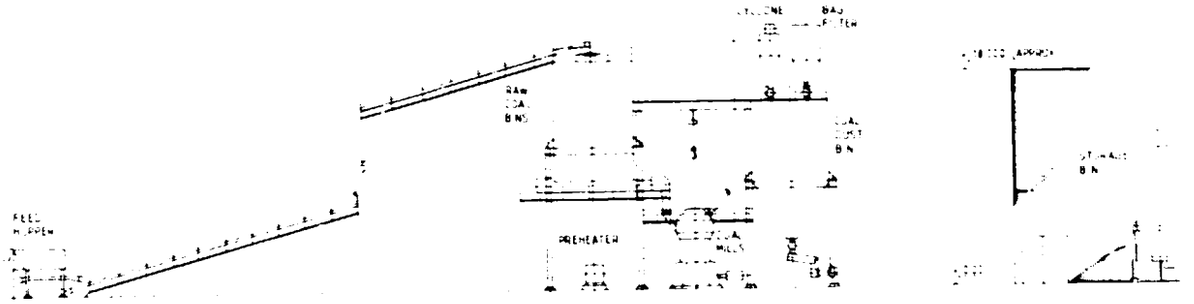




SECTION 2

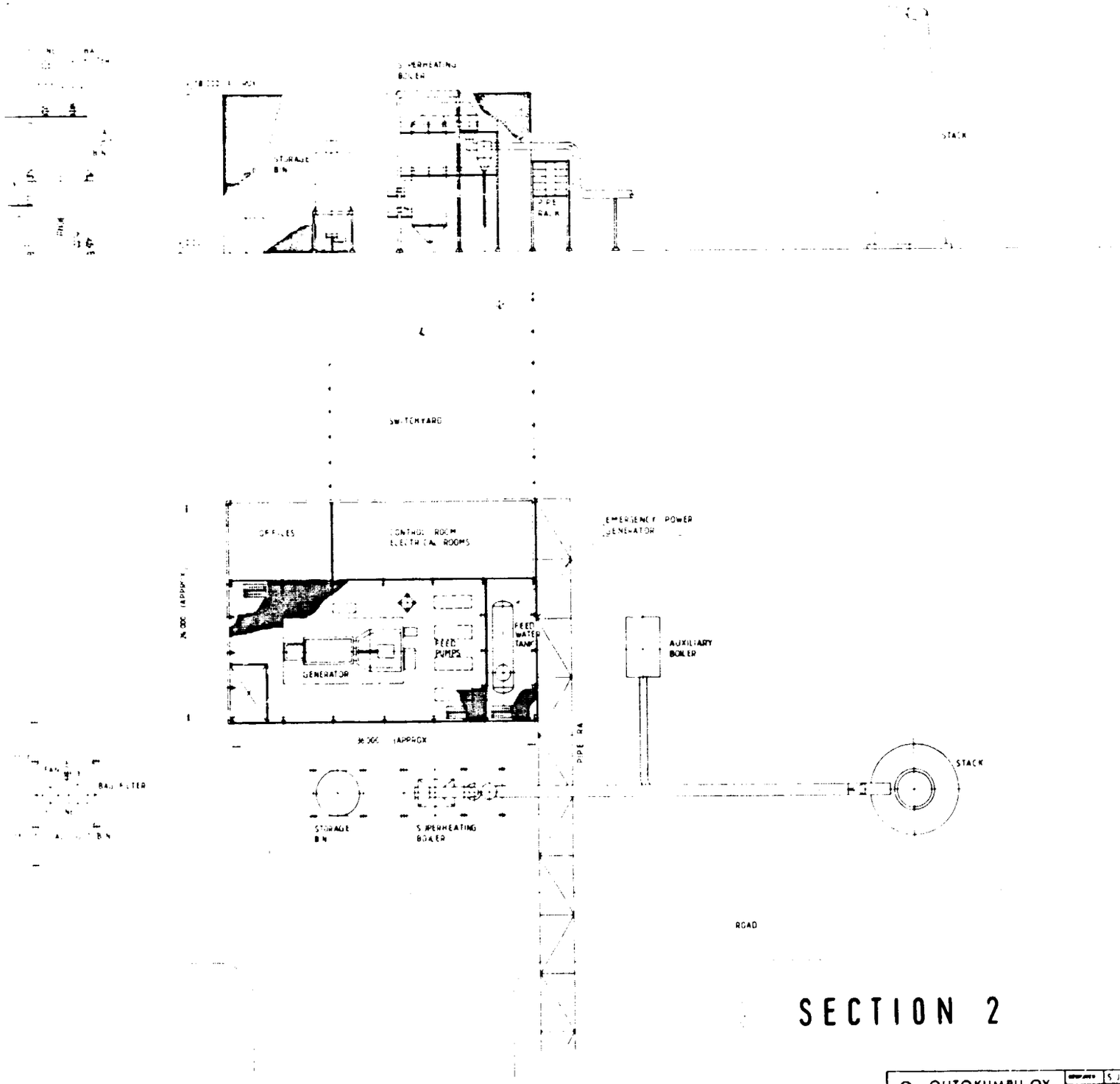
OUTOKUMPU OY

PYRITES PHOSPHATES & CHEMICALS LTD


RAW COAL BINS
PREHEATER
COAL MILLS

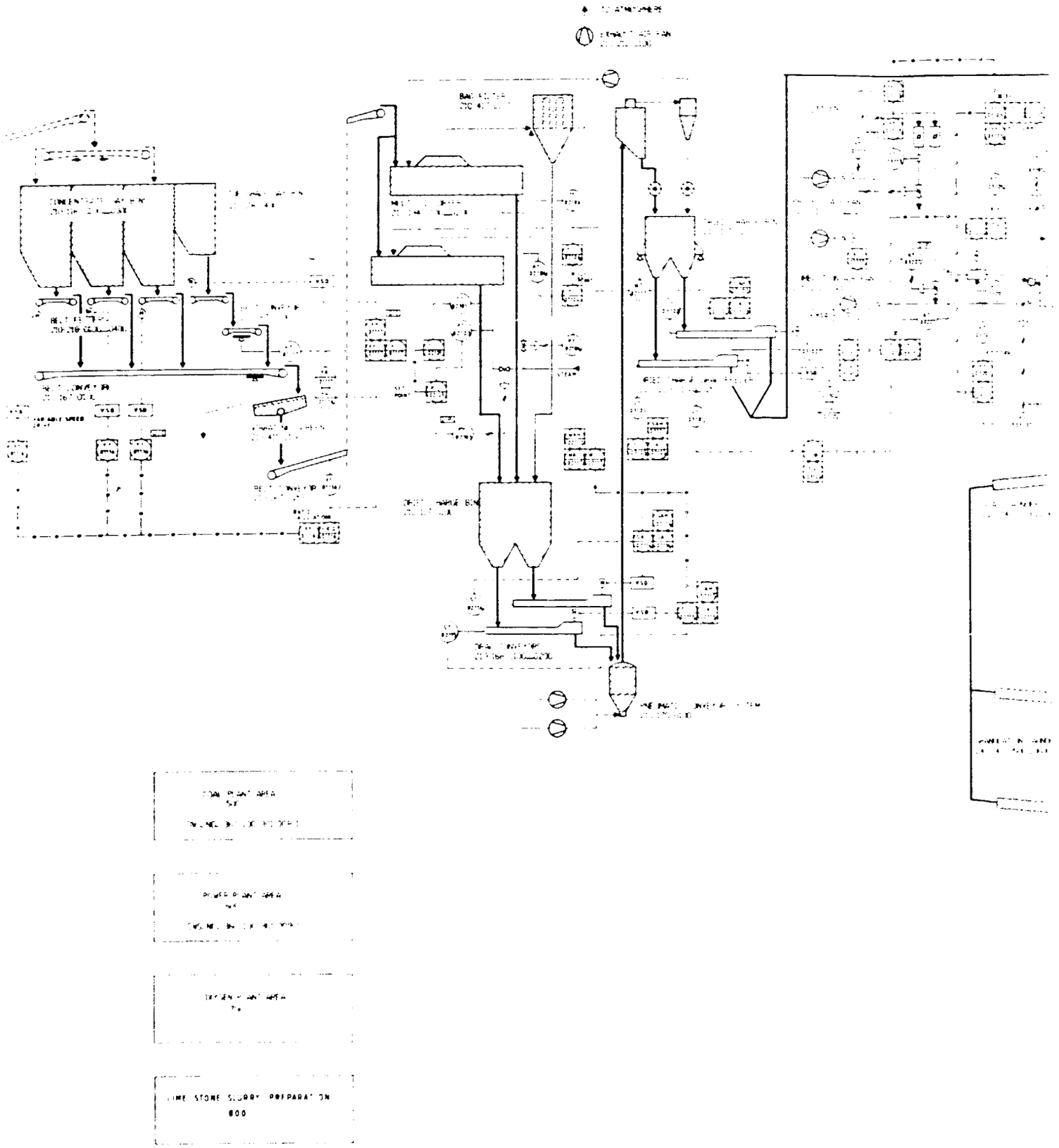

RAW COAL BINS
FAN
BAG FILTER
COAL MILLS
CYCLONE
COAL DUST BIN

SECTION 1

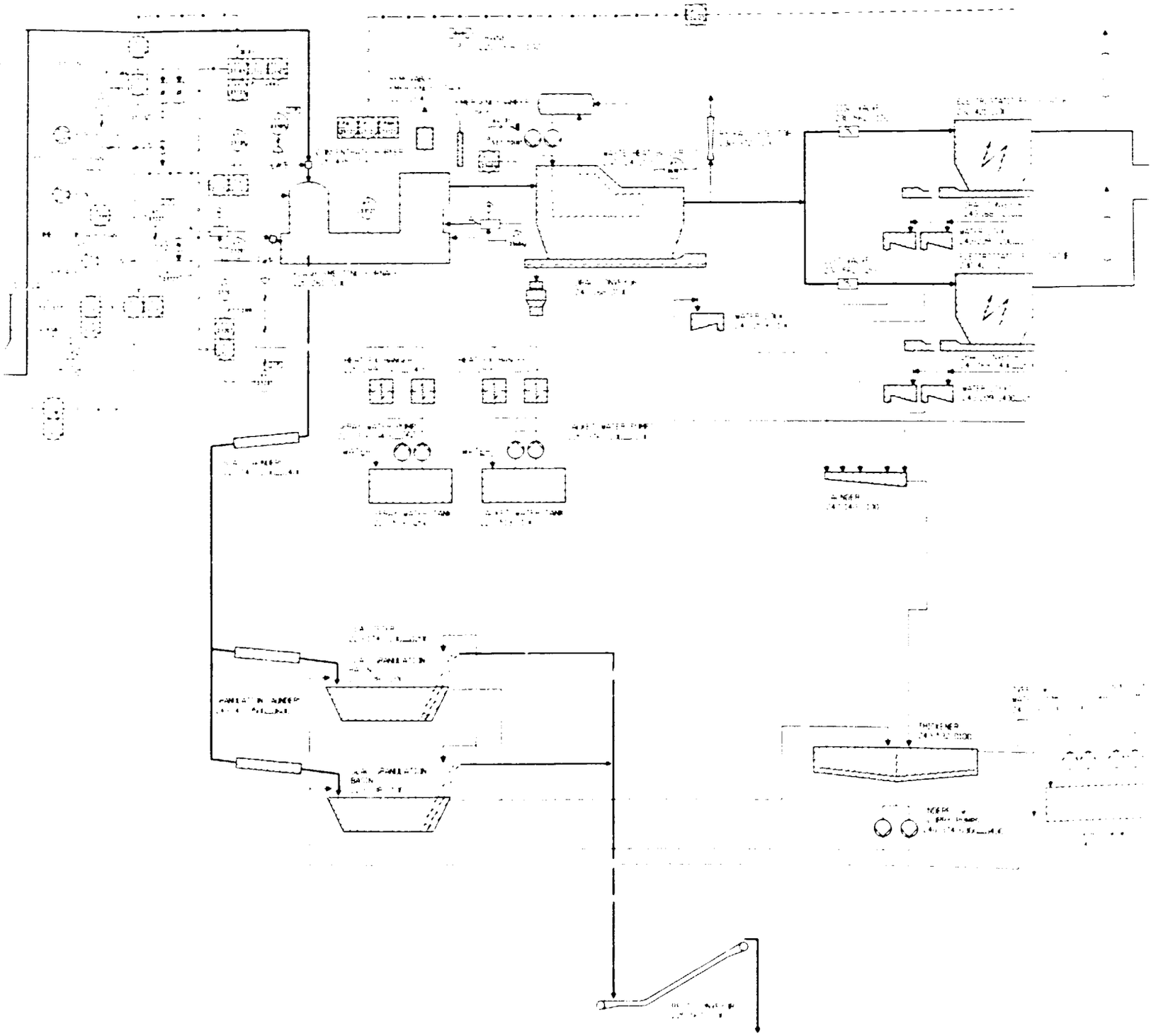


SECTION 2

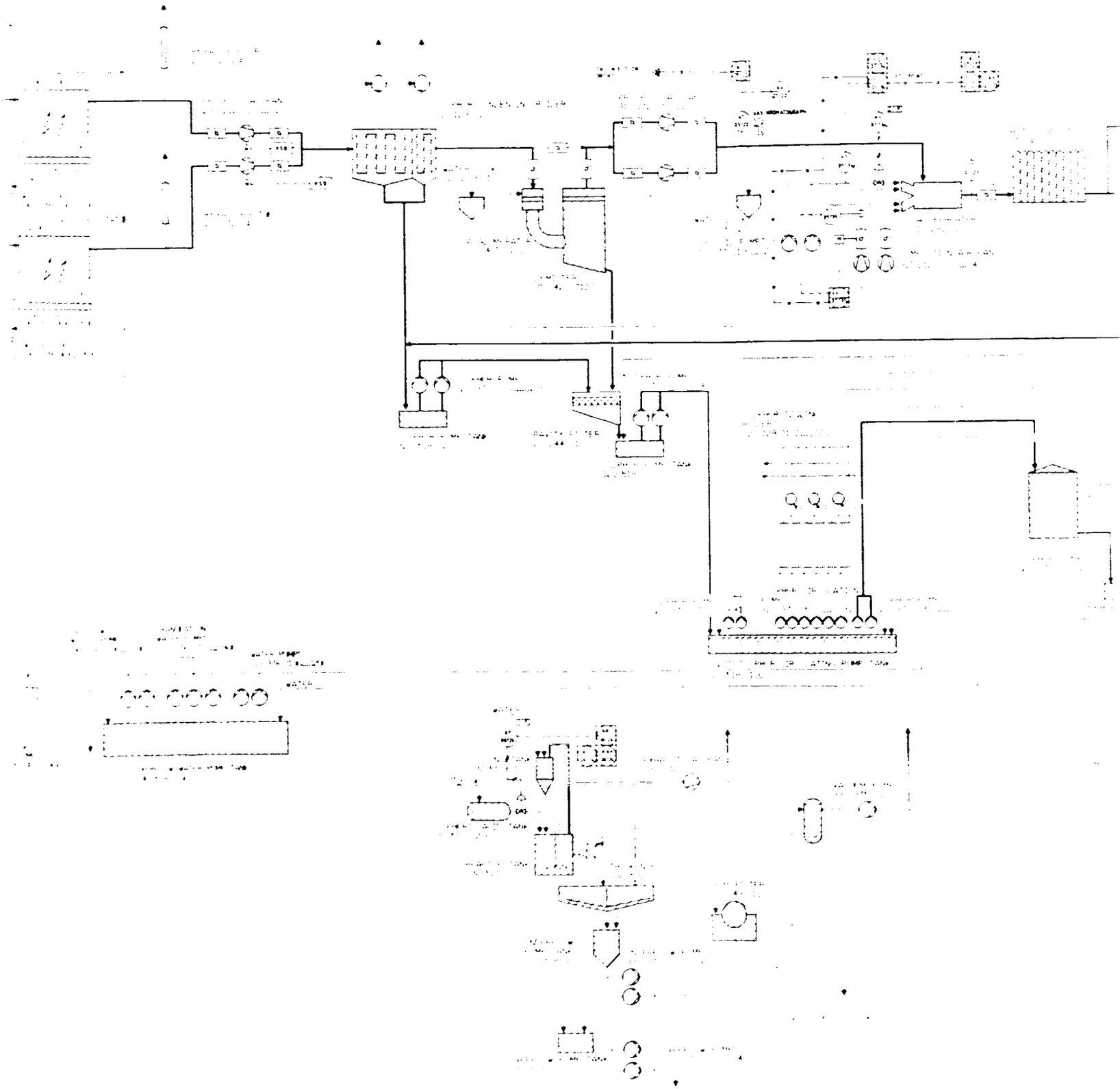
OUTOKUMPU OY ENGINEERING DIVISION	5 JULY 198x
PYRITES PHOSPHATES & CHEMICALS LTD	
PPCL PYRITE SMELTER	1:10
COAL PLANT AND POWER PLANT PLANT LAYOUT	1:200



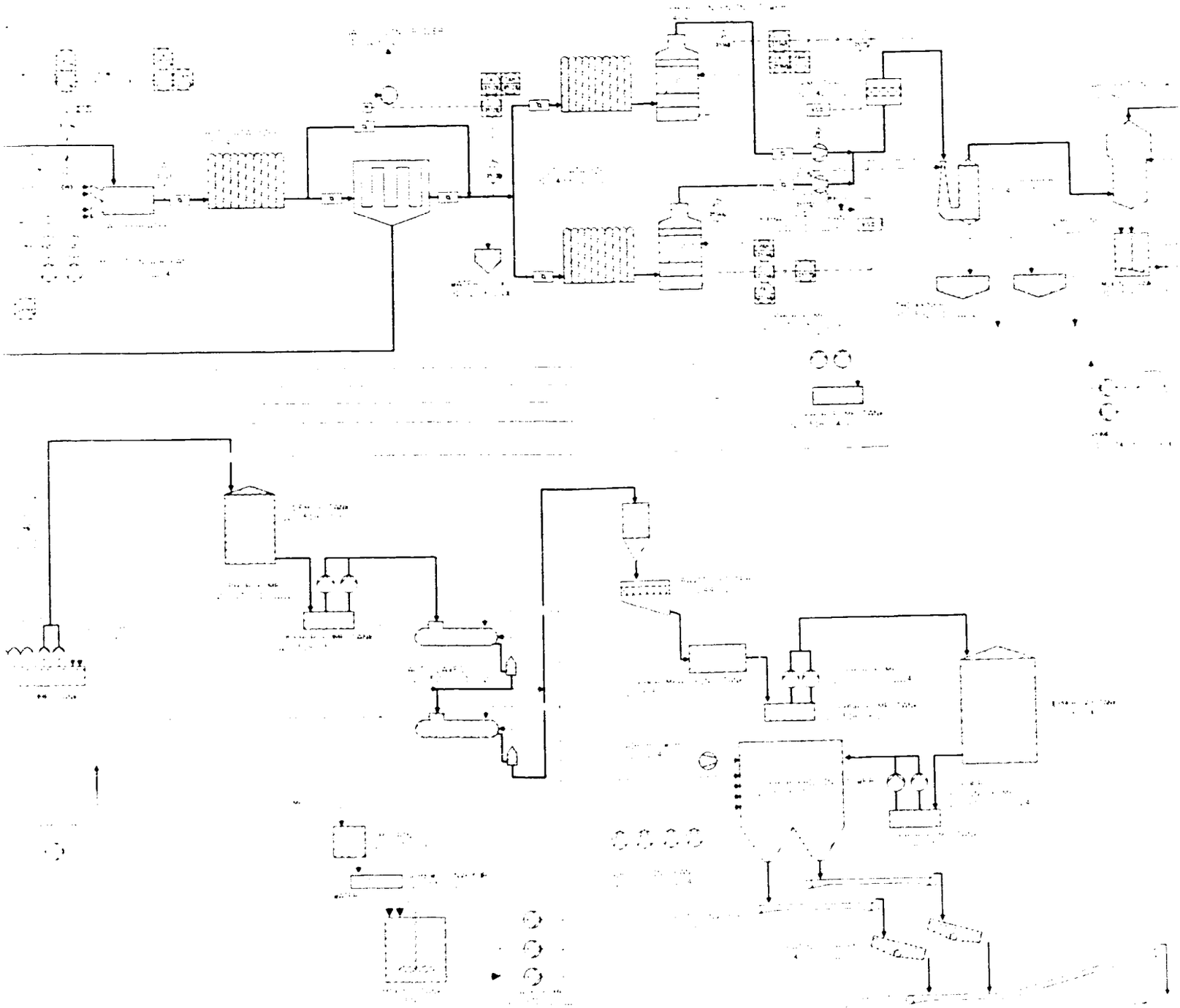
SECTION 1



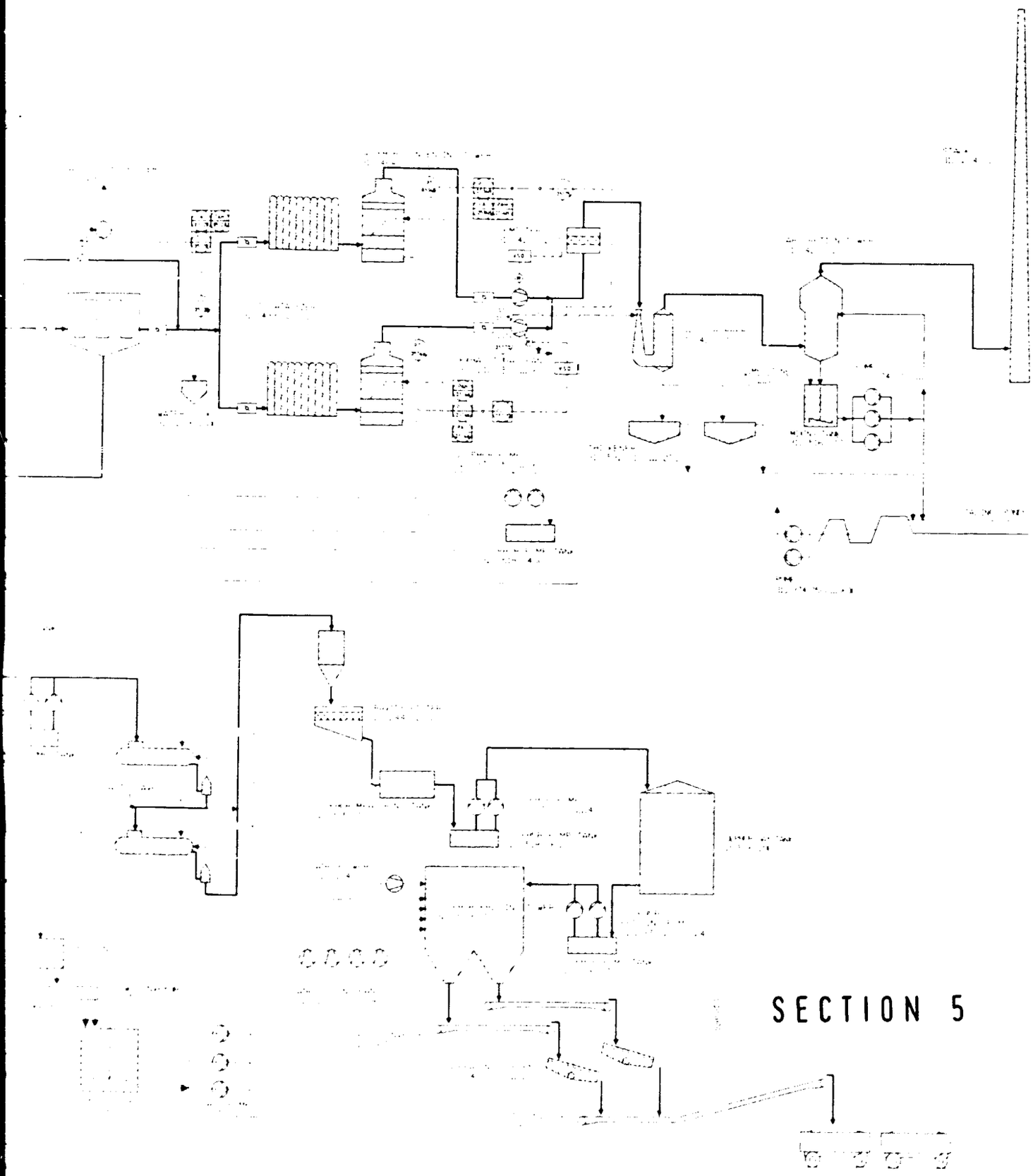
SECTION 2



SECTION 3



SECTION 4



SECTION 5

5
OPERATING DATA

5.1 Supervision and Labour Requirements

5.2 Requirements of Utilities and Consumables

5
OPERATING DATA

5.1
Supervision and Labour Requirements

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

5.1.1
Total Personnel

Plant manager	1
Engineers	6
Foremen	27
Crew	170
TOTAL	204

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 foremen	1		1
Foremen	3	8	11
			13
Operating crew	20	68	88

5.1.4
Power Plant (including Coal Plant)

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

5.1.5
Oxygen Plant

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

5.1.6
Material Transfer (whole area)

	Day shift	Shift	TOTAL
General foreman	1		1
Foremen	1	4	5
			6
Crew	8	12	20

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

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

5.2.1
Flash Smelting Area

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

5.2.2
Sulphur Plant Area

Heavy fuel oil (Bunker C)	t/a	19 000
Electric energy	MWh/a	13 000
Steam 5.5 bar, saturated	t/a	90 000
Filtered raw water	m3/a	975 000
Lime	t/a	330
Lime stone	t/a	90 000
Sulphuric acid	t/a	400
Catalyte mass	t/a	900
Glass wool	m3	500

5.2.3
Power Plant Area incl. Coal Plant

Operation time 7500 + 500 h/a

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

5.2.4
Oxygen Plant Area

Electric energy	MWh/a	66 000
Filtered raw water	m^3/a	15 000

6 ECONOMIC SURVEY

6.1 Estimation of investment cost

6.2 Estimation of operating cost

6.3 Estimation of revenues

6.4 Profitability calculations

6.
ECONOMIC SURVEY

6.1
ESTIMATION OF CAPITAL COST

6.1.1
Basis of capital cost estimate

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

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

Scope of Outokumpu's estimates

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

The following areas are included in the estimates:

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

Terminal points of Outokumpu's estimates

The estimates are limited within the following terminal points

Pyrite: inlet to the dryer feed bins

Coal: inlet to the feed hopper

Bunker C oil: inlet to the day tank

Light fuel oil: inlet to the day tank

Slag and dust: outlet from belt conveyor of slag granulation

Lime: inlet to the lime feed bin

Limestone slurry: inlet to the feed pipe

Tailing of exhaust gas scrubber: outlet from the tailing pumps

Sulphur: outlet from the belt convevors of prilling tower

Process water: inlet to the plant area

Demineralized/semisoft water: inlet to the plant area

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

Electric energy: inlet/outlet at the main switchgear

Sulphuric acid: inlet to the feed tank

Tail gases: outlet from the main stack

Arsenic waste: outlet from the drum filter

Scope of FEDO's estimates

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

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

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

Taxes and duties

Supplies of indigeneous origin:

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

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

Custom duty of foreign supplies

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

Price level

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

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

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

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

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

Foreign Indian supplies

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

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

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

- The basic and detail engineering will be partly foreign and partly Indian.

- Commissioning, supervision and training will be partly foreign, partly Indian.

- The process piping, process gas ducting, electrification and building constructions are of Indian origin. The investment is estimated according to the Indian price level as far as there has been available information of the local unit prices.

- 30 % of instrumentation and automation is assumed to be of Indian origin and 70 % European, the price level is according to the European conditions.

Working capital

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

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

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

6.1.2
Fixed capital, Rs 1000

Items	Basic price FOB/FOR		Freight & Insurance	Taxes and du	
	Indian Supplies	Foreign supplies		Excise duty for Indian supplies 12 %	Custom duty fo foreign supplie 45 % (2
Licence fee		5000			12
Basic engineering	2400	20200			50
Detail engineering	9600	60600			151
Commissioning, supervision of erection and start up, training of staff	7500	52800			1320
Equipment, foreign					
-smelter		154960	7748		697
-sulphur plant		64327	3216		2894
-power plant and coal treatment		64363	3218		2896
-oxygen plant		124000	6200		558
Equipment, Indian					
-air and gas ducting	16630		931	1996	
-others	175703		9839	21084	
Electrification	27788		1556	3335	
Piping and ducting	70000		3920	8400	
Instrumentation and automation	6706	22563	1504	805	1015
Spare parts	12751	21059	1691	1530	947
Erection and installation	104337				
Building constructions	46454				
Subtotal	479869	589872	39824	37149	23772
Miscellaneous, 5 %	23993	29494	1991	1857	1188
TOTAL COST INSIDE OUTOKUMPU'S SCOPE	503863	619366	41815	39007	24960
OFF SITE FACILITIES, TURN KEY	99324 (incl. freight)			5826	
OVERALL INVESTMET	603187	619366	41815	44833	24960
Overall investment witout duties and taxes	603187	619366	41815		

	Freight & Insurance	Taxes and duties			Cost at site		
		Excise duty for Indian supplies 12 %	Custom duty for foreign supplies 45 % (25%)	Sales tax of Indian supplies 4 %	Indian supplies	foreign supplies	Total
5000			1250		1250	5000	6250
0200			5050	96	7546	20200	27746
6600			15150	384	25134	60600	85734
2800			13200	300	21000	52800	73800
1960	7748		69732		77480	154960	232440
4327	3216		28947		32164	64327	96491
4363	3218		28963		32182	64363	96545
4000	6200		55800		62000	124000	186000
	931	1996		745	20302		20302
	9839	21084		7871	214498		214498
	1556	3335		1245	33924		33924
	3920	8400		3136	85456		85456
2563	1504	805	10153	300	19468	22563	42031
1059	1691	1530	9477	571	26020	21059	47080
					104337		104337
					46454		46454
9872	39824	37149	237723	14649	809214	589872	1399086
9494	1991	1857	11886	732	40461	29494	69954
9366	41815	39007	249609	15382	849675	619366	1469041
freight		5826		2106	107256		107256
9366	41815	44833	249609	17488	956931	619366	1576297
9366	41815				603187	661181	1264368

SECTION 2

6.1.3
Working capital

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

6.1.4
Annual breakdown of the investment cost

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

Project Years	Fixed capital Rs 1000	Working capital Rs 1000
1	102,157	
2	322,710	
3	710,384	
4	364,314	
5	46,733	37,548
6	-	39,814
7	-	2,038
Total	1,546,298	79,400

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

ANNUAL BREAK DOWN OF INVESTMENT COST Rs 1000

YEARS	1	2	3	4	5	TOTAL
[illegible] fee	6250					6250
Basic engineering	27746					27746
Detail engineering	42867	42867				85734
Commissioning, supervision of erection and start up, training of staff		1476	18450	29520	24354	73800
Equipment, foreign						
-smelter		58110	134815	34866	4649	232440
-sulphur plant		24123	55965	14474	1930	96491
-power plant and coal treatment		24136	55996	14482	1931	96545
-oxygen plant		46500	107880	27900	3720	186000
Equipment, Indian						
-air and gas ducting		5076	11775	3045	406	20302
-others		53625	124409	32175	4290	214498
Electrification		8392	23747	6106	678	38924
Piping and ducting		8546	59819	15382	1709	85456
Instrumentation and automation		4203	29422	7566	841	42031
Spare parts				47080		47080
Erection and installation			31301	73036		104337
Building costructions		4645	20904	20904		46454
Subtotal	76863	276699	674483	326536	44508	1399088
Miscellaneous, 5 %	3843	13835	33724	16327	2225	69954
TOTAL COST INSIDE OUTOKUMPU'S SCOPE	80706	290533	708207	342862	46733	1469042
OFF-SITE FACILITIES, TURN KEY	21451	32177	32177	21451		107256
OVERALL INVESTMET	102157	322710	740384	364314	46733	1576298
OVERALL INVESTMENT WITHOUT DUTIES AND TAXES	85700	252543	583320	305842	36963	1264368

6.1.5
Financing of the investment

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

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

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

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

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

The interest of short term loans will be 17.5 %.

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

The annual financing schedule is shown on the next page.

FINANCING PLAN, Rs 1000

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

6.2
ESTIMATION OF OPERATING COST

6.2.1
Basis of operating cost estimates

Scope and extent of estimates:

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

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

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

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

Unit prices used in the estimates

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

- Wages and salaries including social cost:

- managers	Rs	3,000	month
- operating engineers	"	2,500	"
- foremen	"	2,500	"
- skilled labour	"	1,800	"
- helpers	"	1,200	"
- Bunker C oil	Rs	3,101	ton
- light fuel oil	"	3,500	"
- coal	"	270	"
- lime	"	600	"
- limestone		30	"
- refractory bricks	"	8,000	"
mortar for bricks	"	5,000	"
cast refractory	"	6,000	"
oxygen lances for tapping	"	10	kg
- tapping clay	"	2,000	ton

- sulphuric acid	"	1,500	"
- glass wool	"	700	m³
- fresh water	"	-	"
- cooling water	"	-	"
- catalyze mass	"	5,500	"

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

6.2.2
Raw materials

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

No transfer price has been used for top shale.

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

6.2.3
Annual operating cost

6.2.3.1
Variable cost

Raw materials Rs 218,750,000

Utilities and supplies

Smelter:

	Annual consumption		Unit Price Rs	Annual cost Rs 1000/a
*Coal	158,000	t	250	39,500
*Electric energy	21,000	MWh	produced in the power plant	
*Refractory bricks	300	t	8000	2,400
*Mortar for bricks	25	t	6000	150
*Oxygen lances	8,000	t	5	40
*Tapping clay	6,000	t	2	12
*Light fuel oil	400	t	3500	1,400

	Annual consumption		Unit Price	Annual cost Rs 1000 a
Sulphur plant:				
*Heavy fuel oil Bunker C	19,000		3141	59,679
*Electric energy	13,000	MWh produced in the power plant		
*Lime	330	t	600	198
*Lime stone	90,000	t	30	2,700
*Sulphuric acid	400	t	1500	360
*Catalyte mass	900	m^3	5500	4,950
*Glass wool	500	m^3	700	350
Power plant and coal treatment:				
*Coal	24,000	t	250	30,000
*Heavy fuel oil	2,300	t	3141	7,224
* Electric energy	10,500	MWh produced in the power plant		
Oxygen plant:				
*Electric energy	66,000	MWh produced in the power plant		
Off-site facilities:				
*Slag dust dumping	583,500	t	10	5,835
*Electric energy	17,250	MWh produced in the power plant		
Subtotal of utilities and supplies				Rs 154,798,000/a
Miscellaneous 5 %				7,740,000 a
Total utilities and supplies				Rs 162,538,000 a
Total variable operating costs				Rs 381,288,000 a

6.2.3.2
Fixed operating cost

		Rs 1000/a
Wages and salaries, main plant		
- plant manager 1	Rs 3000/month	36
- engineers 6	" 2500 "	180
- foremen 27	" 2500 "	810
- operating crew 170	" 1800 "	3,672
Wages and salaries, off-site		
- operating crew 76	Rs 1800/month	1,642
Wages and salaries, maintenance		
- foremen 10	Rs 2500/month	306
- skilled workers 51	" 1800 "	1,102
- helpers 48	" 1200 "	694
Total wages and salaries		8,443

Spare parts and maintenance materials	36,000
subtotal	44,443
General and miscellaneous cost 5%	2,221
Total fixed operating cost	Rs 46,654,000 a

Variable operating cost with different capacities:

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

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

6.3
ESTIMATION OF REVENUES

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

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

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

The sales revenues with the nominal capacity:

*Sulphur	228,000 t/a, Rs 2573/t,	Rs 586,644,000 a
*El.energy	56,250 MWh/a, Rs 650/MWh,	Rs 36,562,500 a
Total revenues		Rs 623,206,500 a

6.4 Profitability calculations

6.4.1 General

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

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

Income taxes:
No income taxes have been considered.

Calculation period:

Construction period:	4 years
Operational period	15 years
	19 years

Start-up of production:
The production rate of the first operating year will be 50 %.

Salvage value of the investment:
5 % of fixed capital

Financing expenses:
The financing terms are as specified in item 6.1.5.

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

The profitability is calculated for four cases:

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

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

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

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

6.4.2
Annual cash flow, internal rate of return and pay back period

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

	IRR of cash flow	IRR of equity	Pay back period
Case 1.	6.5 %	1.1 %	13.3 years
Case 2.	4.7 %	negative	18.5 years
Case 3.	12.0 %	10.8 %	6.4 years
Case 4.	10.5 %	8.8 %	7.2 years

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

6.4.3
Sensitivity analysis

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

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

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

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

For Profit + Cash Flow, Rs '000

Price of sulphur Rs 2,575 per ton

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

Year		1	2	3	4	5	6
Sales revenue						287160	598675
Total operating cost						216025	361320
Depreciation on production installations						17019	15067
Depreciation on other assets						10881	10881
Interest paid		0	0	0	0	13160	151677
Working profit						37516	39851
Investment cost without interests		102157	322710	7403811	361311	16773	
Project cash flow before financing cost		102157	322710	7403811	361311	10881	111804
Long term loans							
Drawing		0	0	341859	437172	66583	
Cumulative end of year		0	0	341859	779031	761053	670
pay back						84561	84561
Interest	% 13	0	0	22221	72858	105602	98177
Short term loans							
Balance		0	0	0	0	180232	76904
Cumulative end of year		0	0	0	0	180231	257135
Interest	% 17.5	0	0	0	0	15770	38250
Equity requirements		102157	322710	420716	0		
Dividend for share holders		102157	322710	420716	0	0	

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

NET PROFIT FOR CALCULATION OF PAY BACK TIME

Sales revenue per annum	623207
Production cost per annum	427912
Average interest per annum	76351
	119911

PAY BACK TIME 13.3 YEARS FROM THE START UP

SECTION 1

A P P E N D I X C-1

	6	7	8	9	10	11	12	13	14	
	598764	623207	623207	623207	623207	623207	623207	623207	623207	623
	12588	381288	381288	381288	381288	381288	381288	381288	381288	38
	13857									
	10054	46654	46654	46654	46654	46654	46654	46654	46654	46
	184677	195265	195265	195265	195265	195265	195265	195265	195265	19
	39813	2037								
	111864	193228	195265	195265	195265	195265	195265	195265	195265	19
	676491	591930	507368	422807	338246	253684	169123	84561	0	
	84561	84561	84561	84561	84561	84561	84561	84561	84561	
	98037	87944	76951	65958	54965	43972	32979	21986	10993	
	76901	26604	17126	8721	1653	11017	28753	16311	67243	16
	257135	283739	301165	309886	308233	294215	265463	219119	151905	
	58270	47326	51179	53467	54085	52714	48972	12103	32467	
	0	0	0	0	0	0	0	0	0	

BEFORE FINANCING EXPENSES: 6.5%

SECTION 2

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	623207	623207	623207	623207	623207	623207	623207	[illegible]	[illegible]
[illegible]	381288	381288	381288	381288	381288	381288	381288	[illegible]	[illegible]
[illegible]	46654	46654	46654	46654	46654	46654	46654	[illegible]	[illegible]
[illegible]	195265	195265	195265	195265	195265	195265	195265	[illegible]	[illegible]
[illegible]	195265	195265	195265	195265	195265	195265	195265	[illegible]	[illegible]
[illegible]	253684	169123	84561	0					
[illegible]	84561	84561	84561	84561					
[illegible]	43972	32979	21986	10993	0	0	0		
[illegible]	11017	28753	16311	67213	165197				
[illegible]	294215	265463	219119	151905	0				
[illegible]	52714	48972	12403	32467	13292				
[illegible]	0	0	0	0	30068	195265	195265	[illegible]	

SECTION 3

Cash Flow, 95 Dec

Price of sulphur RS 2,475 per ton

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

	1	2	3	4	5	6
Sales revenue					287160	541354
Production cost					215025	376044
Depreciation					17910	13431
Royalty					16651	16651
Profit	0	0	0	0	11100	95228
Income taxes					3754	32259
Net profit without interests	102157	322710	710384	364314	16733	
Cash flow before financing	102157	322710	710384	364314	10881	125172
Equity cost						
Long term loans						
Drawn	0	0	341869	437172	66583	
Cumulative cost of loan	0	0	341869	779041	761053	670..
Interest					81561	61561
Payback						
Interest 13 %	0	0	22221	72858	105602	986..
Short Term Loans						
Drawn	0	0	0	0	180232	96157
Cumulative end of year	0	0	0	0	180231	278388
Interest 17.5 %	0	0	0	0	15770	10129
Cash requirements	102157	322710	420746	0		
Net cash for share holders	102157	322710	420746	0	0	0

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

NET PROFIT FOR CALCULATION OF PAY BACK TIME:

Sales revenue per annum	560886
Production cost per annum	394869
Average interest per annum	133721
	32173

PAY BACK TIME 48.5 YEARS FROM THE START UP

SECTION 1

[illegible]

[illegible]

	7	8	9	10	11	12	13	14	
[illegible]	560886	560886	560886	560886	560886	560886	560886	560886	[illegible]
[illegible]	348035	348035	348035	348035	348035	348035	348035	348035	[illegible]
[illegible]									
[illegible]	46654	46654	46654	46654	46654	46654	46654	46654	[illegible]
[illegible]	166197	166197	166197	166197	166197	166197	166197	166197	[illegible]
[illegible]	[illegible]								
[illegible]	164567	166197	166197	166197	166197	166197	166197	166197	[illegible]
[illegible]	591930	507368	422807	338246	253684	169123	84561	0	
[illegible]	81561	81561	81561	81561	81561	81561	81561	81561	
[illegible]	87944	76954	65958	54965	43972	32979	21986	10993	
[illegible]	62089	60163	59654	59048	58325	57463	56436	55213	[illegible]
[illegible]	340478	400611	460295	519343	577667	635130	691567	746779	[illegible]
[illegible]	51151	61848	75332	85718	95988	106120	116086	125855	[illegible]
	0	0	0	0	0	0	0	0	

[illegible] FINANCING EXPENCES: 4.7

SECTION 2

TABLE [illegible]

10	11	12	13	14	15	16	17	18	
560886	560886	560886	560886	560886	560886	560886	560886	560886	
348035	348035	348035	348035	348035	348035	348035	348035	348035	
46654	46654	46654	46654	46654	46654	46654	46654	46654	
166197	166197	166197	166197	166197	166197	166197	166197	166197	
166197	166197	166197	166197	166197	166197	166197	166197	166197	
338246	253684	169123	84561	0					
84561	84561	84561	84561	84561					
54965	43972	32979	21986	10993	0	0	0	0	
59048	58325	57463	56436	55213	38916	46379	55274	65871	
519543	577667	635130	691567	746779	707864	661485	606211	510337	
85718	95988	106120	116086	125855	127281	119818	110923	100323	
0	0	0	0	0	0	0	0	0	

SECTION 3

PROJECT CASH FLOW, Rs 1000

Price of sulphur Rs 3,010.10 per ton

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

Year	1	2	3	4	5	6
Net revenue					332869	691339
Variable operating cost					215025	381288
Change in product inventories					17919	13857
Fixed operating cost					46654	46654
Gross margin	0	0	0	0	89109	280251
Working capital					41357	43906
Investment cost without interests	102157	322710	7410381	364314	46733	
Annual cash flow before financing cost	102157	322710	7410381	364314	1019	236283
Use term loans						
Drawing	0	0	340857	137033	68660	
Book value end of year	0	0	340857	777890	761895	677210
pay back					84655	84655
interest % 13	0	0	22156	72719	105589	99010
Short term loans						
Drawn	0	0	0	0	132125	32285
cumulative end of year	0	0	0	0	132125	99840
interest % 17.5	0	0	0	0	11561	20297
Equity requirements	102157	322710	4216883	0		
Available for share holders	102157	322710	4216883	0	0	0

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

NET PROFIT FOR CALCULATION OF PAY BACK TIME:

Sales revenue per annum	722936
Production cost per annum	127912
Average interest per annum	15086
	215908

PAY BACK TIME 6.1 YEARS FROM THE START UP

SECTION 1

A P P E N D I X 6-3

ear and 100 % later on

5	6	7	8	9	10	11	12	13	
332869	694338	722936	722936	722936	722936	722936	722936	722936	722936
215025	381288	381288	381288	381288	381288	381288	381288	381288	381288
17469	13855								
46654	46654	46654	46654	46654	46654	46654	46654	46654	46654
399109	280251	294994	294994	294994	294994	294994	294994	294994	294994
11557	439968	2363							
16733									
1019	236283	292611	294994	294994	294994	294994	294994	294994	294994
26660									
761835	677210	592585	507930	423275	338620	253965	169310	84655	
84655	84655	84655	84655	84655	84655	84655	84655	84655	84655
105589	99046	88041	77036	66031	55026	44021	33015	22010	11005
132125	32285	108576	0	0	0	0	0	0	
132125	99840	0	0	0	0	0	0	0	
11561	20297	8736	0	0	0	0	0	0	
0	0	11338	133303	144308	155313	166318	177324	188329	199

% BEFORE FINANCING EXPENCES 12.0%

0.85%

ACK TIME

2936

127912

190826

215908

OM THE START UP

SECTION 2

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	46654	46654	46654	46654	[illegible]	[illegible]	[illegible]
[illegible]	291994	291994	291994	291994	291994	[illegible]	[illegible]
291994	291994	291994	291994	291994	291994	[illegible]	[illegible]
[illegible]	253986	169310	84655	0			
[illegible]	84655	84655	84655	84655			
[illegible]	44021	33015	22010	11005			
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
[illegible]	1663418	1277321	1083279	1093331	291994	291994	291994

SECTION 3

PROJECT CASH FLOW, Rs 1000 (CALCULATION OF ECONOMIC INTERNAL RATE OF RETURN)
The investment and operating costs are witouth duties and ta

Price of sulphur Rs 2,573 per ton

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

Year		1	2	3	4	5	6
Net revenue						287160	598764
Variable operating cost						204273	362223
Change in product inventories						17023	13162
Fixed operating cost						44743	44743
Gross margin		0	0	0	0	55167	204960
Working capital						36461	38850
Investment cost without interests		85700	252543	583320	305842	36963	
Annual cash flow before financing cost		85700	252543	583320	305842	18257	166110
Long term loans							
drawing		0	0	259474	363180	56300	
cumulative (end of year)		0	0	259474	622654	611059	543163
pay back						67895	67895
interest	% 13	0	0	16866	57338	84605	79438
Short term loans							
change		0	0	0	0	125432	3478
cumulative (end of year)		0	0	0	1	125433	128911
interest	% 17.5	0	0	0	0	10975	22556
Equity requirements		85700	252543	340712	0		
Available for share holders		85700	252543	340712	0	0	0

INTERNAL RATE OF RETURN OF CASH FLOW (BEFORE FINANCIN
INTERNAL RATE OF RETURN OF EQUITY 8.8%

NET PROFIT FOR CALCULATION OF PAY BACK TIME:

Sales revenue per annum	623207
Production cost per annum	406966
Average interest per annum	40858
	175383

PAY BACK TIME 7.2 YEARS FROM THE START OF

SECTION 1

A P P E N D I X 6-4

TURN
touth duties and taxes

year and 100 % later on

5	6	7	8	9	10	11	12	13	
287160	598764	623207	623207	623207	623207	623207	623207	623207	623
204273	362223	362223	362223	362223	362223	362223	362223	362223	362
17023	13162								
44743	44743	44743	44743	44743	44743	44743	44743	44743	44
55167	204960	216241	216241	216241	216241	216241	216241	216241	216
36461	38850	2037							
36963									
18257	166110	214204	216241	216241	216241	216241	216241	216241	216
56300									
611059	543163	475268	407372	339477	271582	203686	135791	67895	
67895	67895	67895	67895	67895	67895	67895	67895	67895	67
84605	79438	70611	61785	52958	44132	35306	26479	17653	
125432	3478	58233	76862						
125433	128911	70678	0						
10975	22255	17464	6184						
0									
0	0	0	3514	95387	104214	113040	121866	130693	1

FLOW (BEFORE FINANCING EXPENCES) 10.5%
Y 8.8%

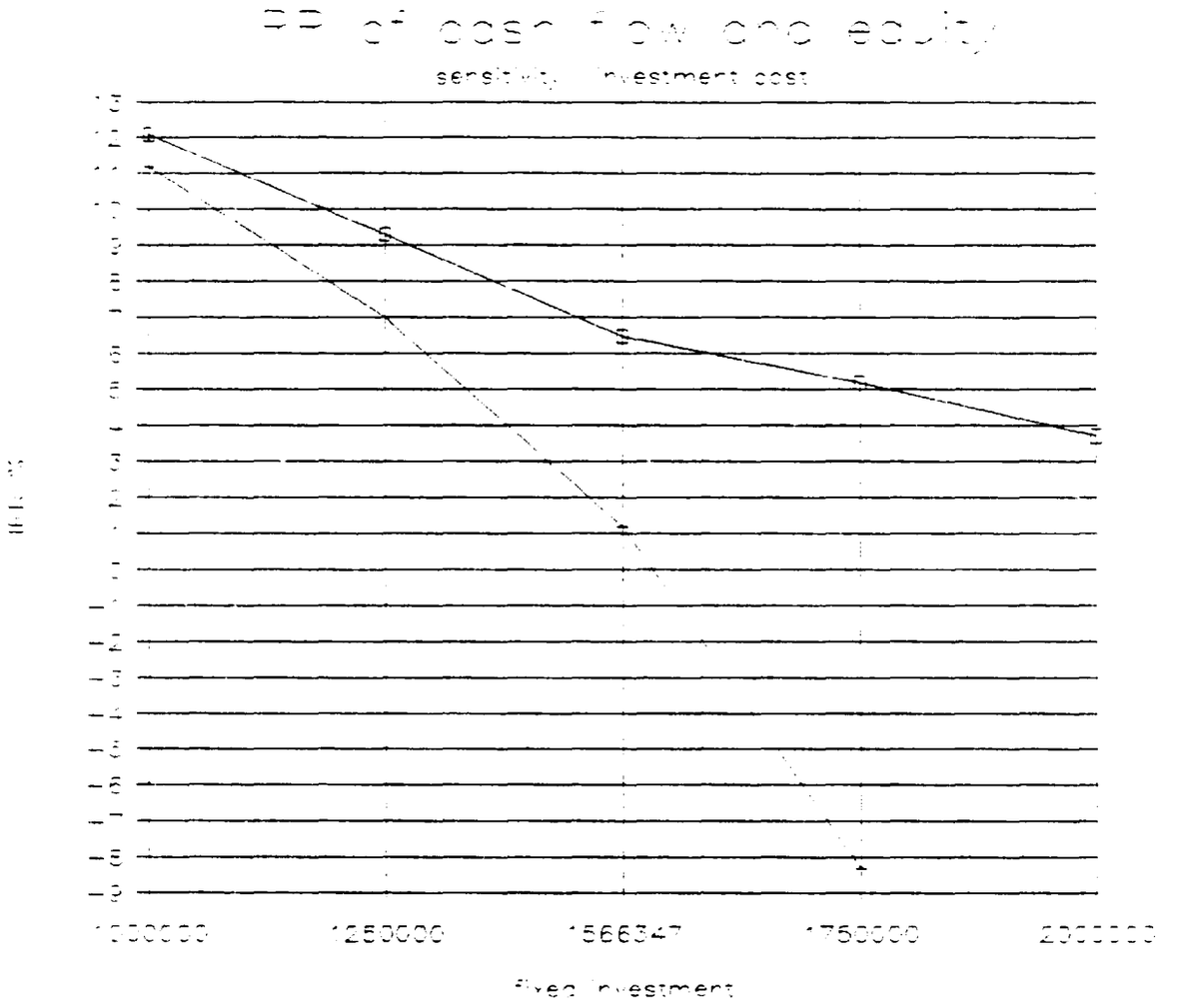
Y BACK TIME
623207
406966
10858

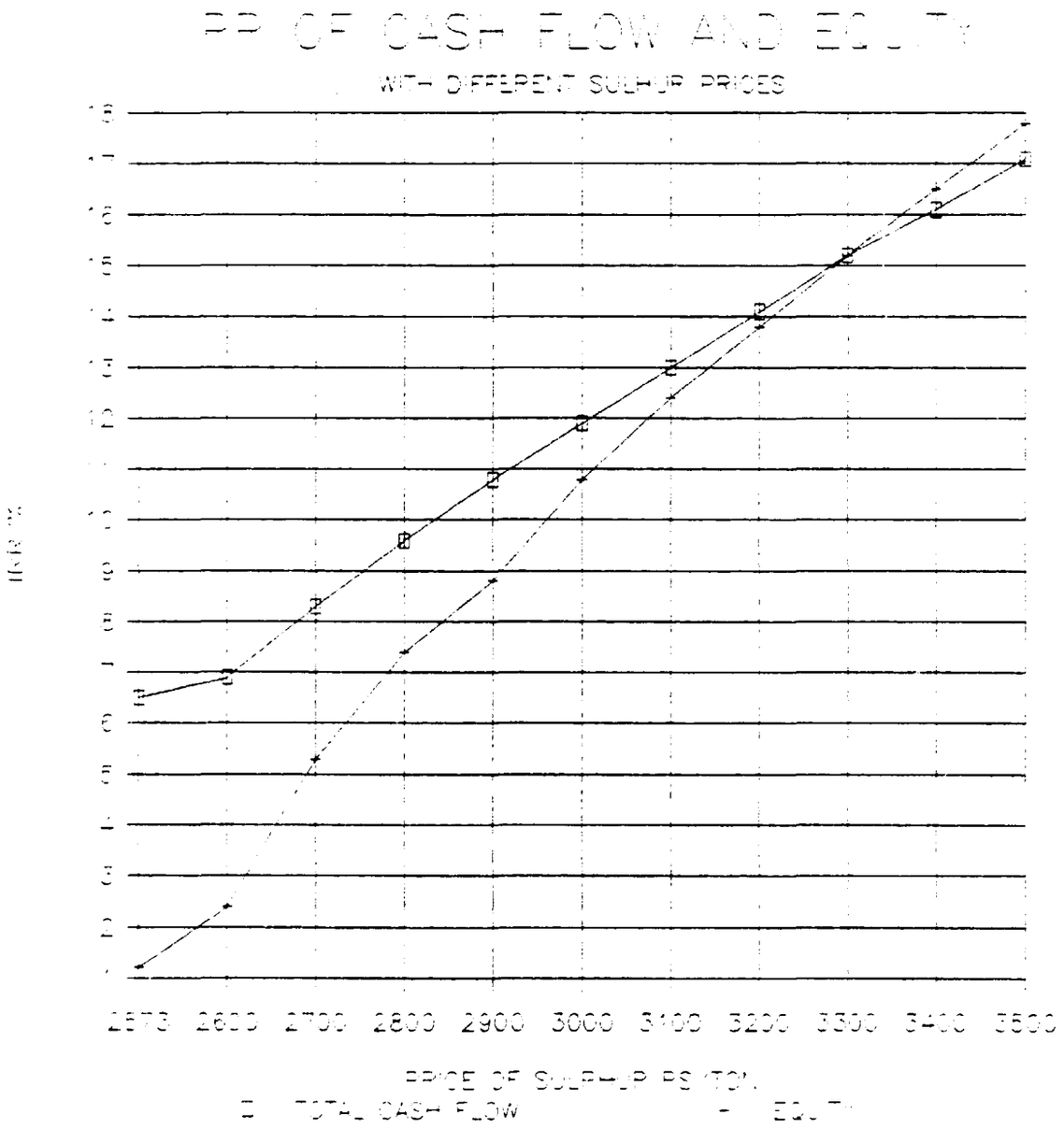
175383
FROM THE START EP

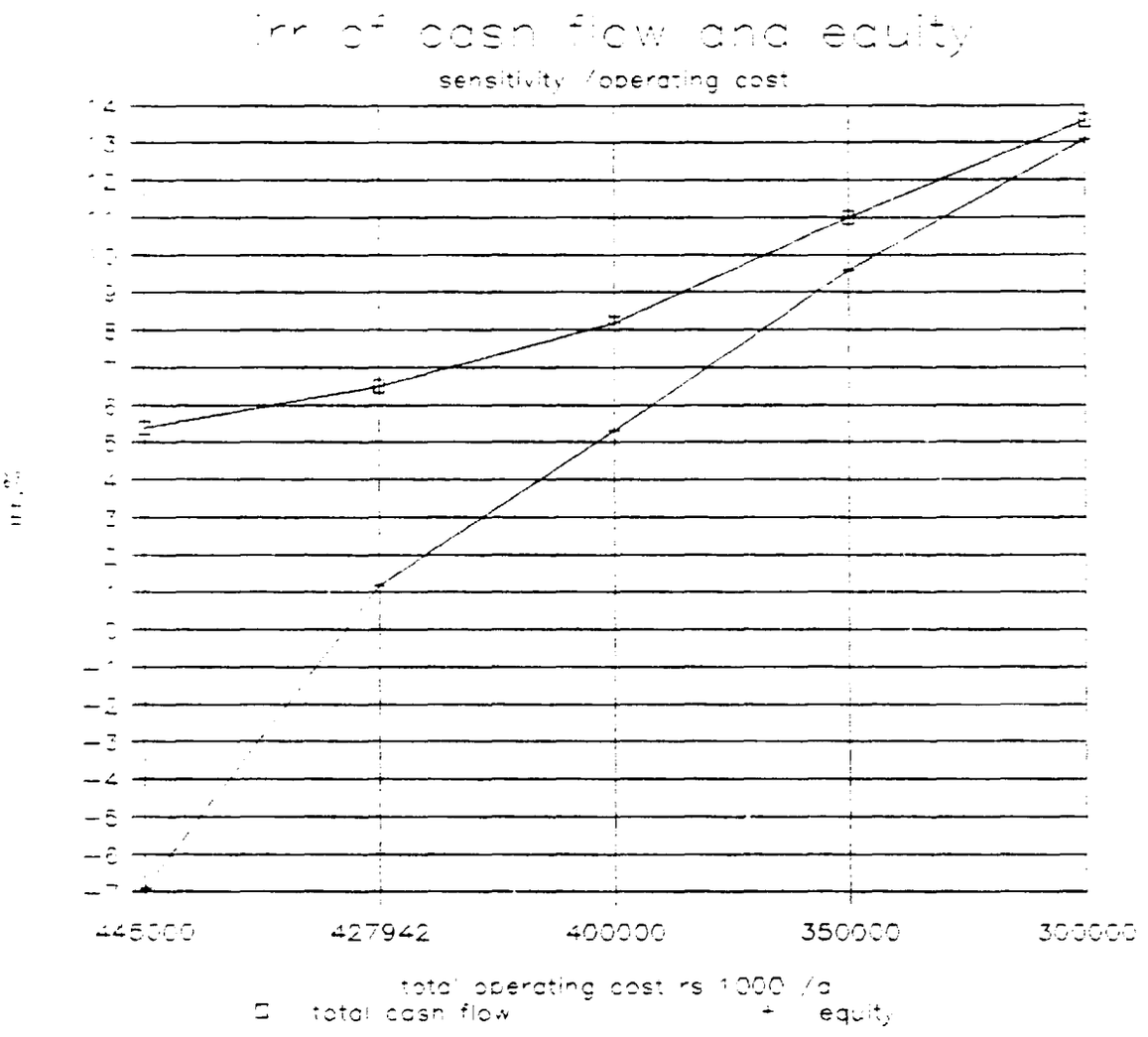
SECTION 2

10	11	12	13	14	15	16	17	18	
623207	623207	623207	623207	623207	623207	623207	623207	623207	
362223	362223	362223	362223	362223	362223	362223	362223	362223	
44743	44743	44743	44743	44743	44743	44743	44743	44743	
216241	216241	216241	216241	216241	216241	216241	216241	216241	
216241	216241	216241	216241	216241	216241	216241	216241	216241	
271582	203686	135791	67895	0					
67895	67895	67895	67895	67895					
44132	35306	26479	17653	8826	0	0	0	0	
104214	113040	121866	130693	139519	216241	216241	216241	216241	

SECTION 3


RR of cost for one equity
sensitivity investment cost
1000000
1250000
1566347
1750000
2000000
fixed investment


WITH DIFFERENT SULFUR PRICES
2573
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500


irr of cash flow and equity
sensitivity /operating cost
445000
427942
400000
350000
300000
total operating cost rs 1000 /a
total cash flow
equity

4.2.2
Equipment List (In Volume II)

Smelter and Sulphur Plant

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

Coal Plant

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

Power Plant

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

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

200-----0

EQUIPMENT TYPE	FLASH SMELTER AREA

210-----0

EQUIPMENT TYPE	DRYER AND FSF FEED AREA

210-116-0100

EQUIPMENT TYPE	CONCENTRATE DAY BIN
CAPACITY	1100 T
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE APPROX. 250 M3
MANUFACTURER	LOCAL

210-116-0200

EQUIPMENT TYPE	CONCENTRATE DAY BIN
CAPACITY	1100 T
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE APPROX. 250 M3
MANUFACTURER	LOCAL

210-116-0300

EQUIPMENT TYPE	CONCENTRATE DAY BIN
CAPACITY	1100 T
VOLUME	(TOTAL) 600 M3
MATERIAL	CONCRETE APPROX. 250 M3
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

210-116-0400

EQUIPMENT TYPE	DAY BIN
SERVICE	TOP SHALE DAY BIN
CAPACITY	600 T
VOLUME	(TOTAL) 300 M3
MATERIAL	CONCRETE APPROX. 180 M3
MANUFACTURER	LOCAL

210-117-0100

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 350 M3
MATERIAL	STEEL
WEIGHT	APPROX.60 T (INCL.STEEL SUPPORTS)
MANUFACTURER	LOCAL

210-117-0200

EQUIPMENT TYPE	DRIED CHARGE BIN
VOLUME	(TOTAL) 50 M3
MATERIAL	STEEL
WEIGHT	APPROX.20 T (INCL.SUPPORTS)
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

210-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	140 T/H
MAIN DIMENSIONS	LENGTH 33000 MM WIDTH 1000 MM INCLANATION: HORIZONTAL
WEIGHT	APPROX. 5 T
INCLUDING	BELT SCALE
MOTOR NO./RATING (KW)	*** 210-167-0100-M1*** 4 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

210-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
CAPACITY	140 T/H
MAIN DIMENSIONS	LENGTH 75000 MM WIDTH 1000 MM INCLANATION: 14 DEGREES
WEIGHT	APPROX. 12 T
MOTOR NO./RATING (KW)	*** 210-167-0200-M1*** 11 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

210-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR TOP SHALE
CAPACITY	40 T/H
MAIN DIMENSIONS	LENGTH 7000 MM INCLANATION:HORIZONTAL
BELT WIDTH	650 MM
WEIGHT	APPROX. 1 T
INCLUDING	BELT SCALE
MOTOR NO./RATING (KW)	***210-167-0300-M1 *** 3.0 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

210-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	80 T/H
MAIN DIMENSIONS	LENGTH 9000 MM WIDTH 800 MM
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW)	***210-168-0100-M1 *** 7.5 ***
MOTOR TITLE	DRAG CONVEYOR
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

210-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR
CAPACITY	80 T/H
MAIN DIMENSIONS	LENGTH 5000 MM WIDTH 800 MM
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW) MOTOR TITLE	***210-168-0200-M1 *** 7,5 *** DRAG CONVEYOR
MANUFACTURER	FOREIGN

210-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
SERVICE	FOR DRIED CHARGE
CAPACITY	150 T/H
WEIGHT	APPROX. 20 T
MOTOR NO./RATING (KW) MOTOR TITLE	***210-170-0100-M1 *** 132 *** AIR BLOWER ***210-170-0100-M2 *** 132 *** AIR BLOWER,STAND BY ***210-170-0100-M3 *** 1,1 *** AIR LOCK ***210-170-0100-M4 *** 1,1 AIR LOCK ***210-170-0100-M5 *** 5 *** RETURN AIR FAN
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

210-194-0100

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	70 T/H
PRESSURE	(STEAM) 20 BAR
MATERIAL	AISI 316
WEIGHT	APPROX. 30 T
MOTOR NO./RATING (KW)	*** 210-194-0100-M1*** 160 ***
MOTOR TITLE	MULTICOIL DRYER
MANUFACTURER	FOREIGN

210-194-0200

EQUIPMENT TYPE	MULTICOIL DRYER
TYPE	STEAM DRYER
CAPACITY	70 T/H
PRESSURE	(STEAM) 20 BAR
MATERIAL	AISI 316
WEIGHT	APPROX. 30 T
MOTOR NO./RATING (KW)	***210-194-0200-M1 *** 160 ***
MOTOR TITLE	MULTICOIL DRYER
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

210-212-0100

EQUIPMENT TYPE	EXHAUST AIR FAN
SERVICE	EXHAUST AIR FAN FOR BAG FILTER
CAPACITY	30000 NM3/H
MATERIAL	AISI 316
WEIGHT	APPROX. 1,5 T
MOTOR NO./RATING (KW)	***210-212-0100-M1 *** 45 ***
MOTOR TITLE	EXHAUST AIR FAN
MANUFACTURER	FOREIGN

210-218-0100

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	12000 M
BELT WIDTH	1200 MM
BELT INCLINE	NONE
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW)	*** 210-218-0100-M1*** 7,5 ***
MOTOR TITLE	BELT FEEDER
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

210-218-0200

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	12000 M
BELT WIDTH	1200 MM
BELT INCLINE	NONE
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW)	*** 210-218-0200-M1*** 7,5 ***
MOTOR TITLE	BELT FEEDER
MANUFACTURER	LOCAL

210-218-0300

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
CAPACITY	25-120 T/H
BELT LENGTH	12000 M
BELT WIDTH	1200 MM
BELT INCLINE	NONE
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW)	*** 210-218-0300-M1*** 7,5 ***
MOTOR TITLE	BELT FEEDER
MANUFACTURER	LOCAL

210-218-0400

EQUIPMENT TYPE	BELT FEEDER
SERVICE	BELT FEEDER FOR TOP SHALE
CAPACITY	4-40 T/H
BELT LENGTH	8000 MM
BELT WIDTH	800 MM
BELT INCLINE	NONE
WEIGHT	APPROX. 5 T
MOTOR NO./RATING (KW)	***210-218-0400-M1 *** 3,0 ***
MOTOR TITLE	BELT FEEDER
MANUFACTURER	LOCAL

210-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
CAPACITY	140 T/H
FRACTION	25 MM
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***210-411-0100-M1 *** 15 ***
MOTOR TITLE	VIBRATING SCREEN
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

210-417-0100

EQUIPMENT TYPE	BAG FILTER
CAPACITY	30000 NM3/H
TEMPERATURE	110 C
WEIGHT	APPROX. 5 T
MATERIAL	HOUSING: AISI 316, BAGS: POLYACRYLNITR.
MANUFACTURER	FOREIGN

220-----0

EQUIPMENT TYPE	FLASH SMELTING FURNACE AREA

220-108-0100

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR SLAG
DIMENSIONS	L X W X H : 11 X 3 X 2 M
MATERIAL	CONCRETE, ESTIMATED VOLUME:40 M3
MANUFACTURER	LOCAL

220-108-0200

EQUIPMENT TYPE	GRANULATION BASIN
SERVICE	FOR SLAG
DIMENSIONS	L X W X H : 11 X 3 X 2 M
MATERIAL	CONCRETE, ESTIMATED VOLUME:40 M3
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-131-0100

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-131-0200

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-131-0300

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-131-0400

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-131-0500

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

220-131-0600

EQUIPMENT TYPE	COAL DUST BURNER
CAPACITY	0,3- 1 T/H
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-133-0100

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-133-0200

EQUIPMENT TYPE	AUXILIARY BURNER
SERVICE	START UP BURNER
CAPACITY	150-600 KG/H
FUEL	LIGHT OIL
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

220-140-0100

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 12000 MM
MATERIAL	COPPER
WEIGHT	APPROX.11 T
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-140-0200

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 12000 MM
MATERIAL	COPPER
WEIGHT	APPROX.11 T
MANUFACTURER	FOREIGN

220-140-0300

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 12000 MM
MATERIAL	COPPER
WEIGHT	APPROX.11 T
MANUFACTURER	FOREIGN

220-140-0400

EQUIPMENT TYPE	SLAG LAUNDER WITH COVERS
DIMENSIONS	LENGTH 12000 MM
MATERIAL	COPPER
WEIGHT	APPROX.11 T
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-140-0500

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM
MATERIAL	STEEL
WEIGHT	APPROX. 1,5 T
MANUFACTURER	LOCAL

220-140-0600

EQUIPMENT TYPE	GRANULATION LAUNDER
DIMENSIONS	LENGTH 3500 MM
MATERIAL	STEEL
WEIGHT	APPROX. 1,5 T
MANUFACTURER	LOCAL

220-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR SLAG
CAPACITY	100 T/H
MAIN DIMENSIONS	LENGTH 35000 MM WIDTH 650 MM
BELT INCLINE	10 DEGREES
WEIGHT	APPROX. 3 T
MOTOR NO./RATING (KW)	***220-167-0100-M1 ***11 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-174-0100

EQUIPMENT TYPE	RAKE CLASSIFIER
TYPE SERVICE	SCRAPER DEWATERING CONVEYOR FOR SLAG
CAPACITY	100 T/H
MAIN DIMENSIONS	L:11000 MM B:2000 MM
WEIGHT	APPROX. 25 T
MOTOR NO./RATING (KW) MOTOR TITLE	***220-174-0100-M1 *** 11 *** RAKE CLASSIFIER
MANUFACTURER	FOREIGN

220-174-0200

EQUIPMENT TYPE	RAKE CLASSIFIER
TYPE SERVICE	SCRAPER DEWATERING CONVEYOR FOR SLAG
CAPACITY	100 T/H
MAIN DIMENSIONS	L: 11000 MM, B:2000 MM
WEIGHT	APPROX. 25 T
MOTOR NO./RATING (KW) MOTOR TITLE	***220-174-0200-M1 *** 11 *** RAKE CLASSIFIER
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-198-0100

EQUIPMENT TYPE	GAS DUCTWORK
SERVICE	PROCESS AND COMBUSTION AIR DUCTING
INCLUDING	
DIMENSIONS	TOTAL LENGTH:150 M,WALL THICKNESS: 4 AND 6 MM,DIAM:700 AND 1600 MM
MATERIAL	MILD STEEL
WEIGHT	21 T TOTAL (SUPPORTS NOT INCL.)
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

220-198-0200

EQUIPMENT TYPE	GAS DUCTWORK
SERVICE	OXYGEN DUCTING FOR SMELTER PLANT.
INCLUDING	
DIMENSIONS	TOTAL LENGTH:250 M,WALL THICKNESS: 4 MM,DIAM:700 MM
MATERIAL	STAINLESS STEEL
WEIGHT	18 T TOTAL (SUPPORTS EXCLUDED)
MANUFACTURER	LOCAL

220-212-0100

EQUIPMENT TYPE	PROCESS AIR FAN
TYPE	CENTRIFUGAL
CAPACITY	40000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C
WEIGHT	APPROX. 2,5 T
MOTOR NO./RATING (KW)	*** 220-212-0100-M1*** 160 ***
MOTOR TITLE	PROCESS AIR FAN
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-212-0200

EQUIPMENT TYPE	PROCESS AIR FAN
TYPE	CENTRIFUGAL
CAPACITY	40000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C
WEIGHT	APPROX. 2,5 T
MOTOR NO./RATING (Kw)	*** 220-212-0200-M1*** 160 ***
MOTOR TITLE	PROCESS AIR FAN
MANUFACTURER	LOCAL

220-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
TYPE	CENTRIFUGAL
CAPACITY	20000 NM3/H
PRESSURE	9 KPA
TEMPERATURE	35 C
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***220-212-0300-M1*** 110 ***
MOTOR TITLE	COMBUSTION AIR FAN
MANUFACTURER	LOCAL

220-223-0100

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	7-70 T/H
MAIN DIMENSIONS	LENGTH 10000 MM WIDTH 800 MM
WEIGHT	APPROX. 8 T
MOTOR NO./RATING (KW)	***220-223-0100-M1 *** 11 ***
MOTOR TITLE	DRAG FEEDER
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-223-0200

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
CAPACITY	7-70 T/H
MAIN DIMENSIONS	LENGTH 10000 MM WIDTH 800 MM
WEIGHT	APPROX. 8 T
MOTOR NO./RATING (Kw) MOTOR TITLE	***220-223-0200-M1 *** 11 *** DRAG FEEDER
MANUFACTURER	FOREIGN

220-261-0100

EQUIPMENT TYPE	FLASH SMELTING FURNACE
SERVICE	FOR PYRITE
CAPACITY MAIN DIMENSIONS	120 T/H REACTION SHAFT D=6.5 M H=7.0 M SETTLER L=22 M
NO. OF TAP HOLES	UPTAKESHAFT D=6.0 M H=15 M SLAG HOLES 4
BURNER OPENINGS	SETTLER 6 FOR COAL
MANUFACTURER	LOCAL/FOREIGN
REMARKS	STEEL CONSTRUCTION 950 T (LOCAL) BASIC BRICKS 1200 T (FOREIGN) NON BASIC BRICKS 370T (LOCAL) COOLING ELEMENTS 110 T (FOREIGN) SPRINGS 5 T (FOREIGN)

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 9C0 001 ALT1
DESIGN :AKI

CLIENT NO :
REVISION :5 DATE :22.08.85

220-289-0100

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
CAPACITY	700 M3/H
TEMPERATURE RANGE	WATER IN:50 DEG.C. OUT:40 DEG.C.
WEIGHT	APPROX. 5 T
MANUFACTURER	LOCAL

220-289-0200

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	700 M3/H
TEMPERATURE RANGE	WATER IN:50 DEG.C. OUT:40 DEG.C.
WEIGHT	APPROX. 5 T
MANUFACTURER	LOCAL

220-289-0300

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
CAPACITY	300 M3/H
TEMPERATURE RANGE	WATER IN:50 DEG.C. OUT:40 DEG.C.
WEIGHT	APPROX.2,5 T
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

220-289-0400

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER
SERVICE	STAND BY
CAPACITY	300 M3/H
TEMPERATURE RANGE	WATER IN:50 DEG.C. OUT:40 DEG.C.
WEIGHT	APPROX. 2,5 T
MANUFACTURER	LOCAL

220-318-0100

EQUIPMENT TYPE	OVERHEAD TRAVELLING CRANE
LIFTING CAPACITY	10 T
LIFTING HEIGHT	34 M
SPAN	24 M
WEIGHT	APPROX. 20 T
MOTOR NO./RATING (KW)	***220-318-0100-M1 *** 11 ***
MOTOR TITLE	OVERHEAD TRAVELLING CRANE
	***220-318-0100-M2 *** 2,2 ***
	OVERHEAD TRAVELLING CRANE
	***220-318-0100-M3 *** 1,1 ***
	OVERHEAD TRAVELLING CRANE
MANUFACTURER	LOCAL

220-376-0100

EQUIPMENT TYPE	JACKET WATER PUMP
CAPACITY	700 M3/H
PRESSURE	650 KPA
WEIGHT	APPROX. 3 T
MOTOR NO./RATING (KW)	***220-376-0100-M1 ***200 ***
MOTOR TITLE	JACKET WATER PUMP
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

220-376-0200

EQUIPMENT TYPE	JACKET WATER PUMP
SERVICE	STAND BY
CAPACITY	700 M3/H
PRESSURE	650 KPA
WEIGHT	APPROX. 3 T
MOTOR NO./RATING (KW)	***220-376-0200-M1 ***200 ***
MOTOR TITLE	JACKET WATER PUMP
MANUFACTURER	LOCAL

220-376-0400

EQUIPMENT TYPE	SPRAY WATER PUMP
CAPACITY	300 M3/H
PRESSURE	600 KPA
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***220-376-0400-M1 *** 90 ***
MOTOR TITLE	SPRAY WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-376-0500

EQUIPMENT TYPE	SPRAY WATER PUMP
SERVICE	STAND BY
CAPACITY	300 M3/H
PRESSURE	600 KPA
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***220-376-0500-M1 *** 90 ***
MOTOR TITLE	SPRAY WATER PUMP
MANUFACTURER	LOCAL

220-376-0700

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA
WEIGHT	APPROX. 2,5 T
MOTOR NO./RATING (KW)	***220-376-0700-M1 *** 90 ***
MOTOR TITLE	GRANULATION WATER PUMP
MANUFACTURER	LOCAL

220-376-0800

EQUIPMENT TYPE	GRANULATION WATER PUMP
CAPACITY	600 M3/H
PRESSURE	350 KPA
WEIGHT	APPROX. 2,5 T
MOTOR NO./RATING (Kw)	***220-376-0800-M1 *** 90 ***
MOTOR TITLE	GRANULATION WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-376-0900

EQUIPMENT TYPE	GRANULATION WATER PUMP
SERVICE	STAND BY
CAPACITY	600 M3/H
PRESSURE	350 KPA
WEIGHT	APPROX. 2,5
MOTOR NO./RATING (Kw)	***220-376-0900-M1 *** 90 ***
MOTOR TITLE	GRANULATION WATER PUMP
MANUFACTURER	LOCAL

220-435-0100

EQUIPMENT TYPE	CONCENTRATE BURNER
CAPACITY	120 T/H
MAIN DIMENSIONS	
WEIGHT	APPROX. 5 T
MANUFACTUFER	FOREIGN

220-519-0100

EQUIPMENT TYPE	JACKET WATER TANK
VOLUME	400 M3
MATERIAL	CONCRETE 100 M3 STEEL COVER
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-519-0200

EQUIPMENT TYPE	SPRAY WATER TANK
VOLUME	300 M3
MATERIAL	CONCRETE 80 M3 STEEL COVER
MANUFACTURER	LOCAL

220-519-0300

EQUIPMENT TYPE	OIL TANK
SERVICE	FOR HEAVY FUEL OIL
VOLUME	700 M3
DIMENSIONS	DIAM:9,5M ,HIGHT:10,0 M
MATERIAL	MILD STEEL
MANUFACTURER	LOCAL
REMARKS	SUPPLIED WITH STEAM HEATING PIPES

220-519-0400

EQUIPMENT TYPE	OIL TANK
SERVICE	FOR LIGHT FUEL OIL
VOLUME	18 M3
DIMENSIONS	DIAM:2,8M,HIGHT:3 M
MATERIAL	MILD STEEL
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-569-0100

EQUIPMENT TYPE	EMERGENCY DAMPER BETWEEN FSF-WHB
MAIN DIMENSIONS	6 X 5 M
TEMPERATURE	WATER IN:30 DEG.C. OUT:60 DEG.C.
WEIGHT	APPROX. 6 T
MANUFACTURER	LOCAL
REMARKS	- WATER FLOW:100 M3/H WATER PRESSURE:4 BAR

230-----0

EQUIPMENT TYPE	PROCESS GAS HANDLING AREA

230-124-0100

EQUIPMENT TYPE	WASTE HEAT BOILER
TYPE	FORCED CIRCULATION
SERVICE	FOR FLASH SMELTING FURNACE
CAPACITY	SATURATED STEAM 140 T/H
PRESSURE	70 BAR
GAS FLOW	130000 NM3/H
TEMPERATURE	INLET 1250 C
	OUTLET 350 C
WEIGHT	APPROX. BOILER:600 T SUPPORTS:350 T
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

230-198-0100

EQUIPMENT TYPE	GAS DUCTWORK
SERVICE	PROCESS GAS DUCTING FOR AREA 230
DIMENSIONS	TOTAL LENGTH:175 M DIAM:1800, 2000,2200 MM,WALL THICKNESS:8 MM
MATERIAL	MILD STEEL
WEIGHT	71 T (TOTAL,SUPPORTS NOT INCLUDED)
MANUFACTURER	LOCAL

230-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	70000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (KW)	***230-212-0100-M1 *** 250 ***
MOTOR TITLE	PROCESS GAS FAN
MANUFACTURER	FOREIGN
REMARKS	INVERTER REGULATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

230-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	70000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	360 C
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (KW)	***230-220-0200-M1 *** 250 ***
MOTOR TITLE	PROCESS GAS FAN
MANUFACTURER	FOREIGN
REMARKS	INVERTER REGULATED

230-372-0100

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-PASS EJECTOR BETWEEN WHB AND EP.
CAPACITY	GAS FLOW 60 000 NM3/H
MATERIAL	STAINLESS STEEL
WEIGHT INCLUDING	APPROX. 1,5 T INLET VALVES
MANUFACTURER	FOREIGN
REMARKS	SUCTION:1 KPA

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

CLIENT NO :
REVISION :5 DATE :22.08.85

230-372-0200

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.
CAPACITY	GAS FLOW: 20 000 NM3/H
MATERIAL	STAINLESS STEEL
WEIGHT INCLUDING	APPROX. 0,5 T INLET VALVE
MANUFACTURER	FOREIGN
REMARKS	- SUCTION:1 KPA

230-372-0300

EQUIPMENT TYPE	EJECTOR
SERVICE	BY-BASS EJECTOR AFTER EP.
CAPACITY	GAS FLOW: 4 000 NM3/H
MATERIAL	STAINLESS STEEL
WEIGHT INCLUDING	APPROX. 0,5 T INLET VALVE
MANUFACTURER	FOREIGN
REMARKS	- SUCTION:1 KPA

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

CLIENT NO :
REVISION :5 DATE :22.08.85

230-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	WHB CIRCULATION WATER PUMP
CAPACITY	1100 M3/H
HEAD	40 M
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (Kw)	***230-376-0100-M1 *** 200 ***
MOTOR TITLE	WHB CIRCULATION WATER PUMP
MANUFACTURER	FOREIGN

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
WEIGHT	APPROX. 1,5 T
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

230-421-0100

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	70000 NM3/H
TEMPERATURE	360 C
WEIGHT	APPROX. PRECIPITATOR 370 T SUPPORTS 50 T
MOTOR NO./RATING (KW)	*** SEVERAL,TOTAL *** 90 ***
MOTOR TITLE	
MANUFACTURER	FOREIGN

230-421-0200

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
TYPE	
SERVICE	FOR WHB
CAPACITY	70000 NM3/H
TEMPERATURE	360 C
WEIGHT	APPROX. PRECIPITATOR 370 T SUPPORTS 50 T
MOTOR NO./RATING (KW)	*** SEVERAL,TOTAL *** 90 ***
MOTOR TITLE	
MANUFACTURER	FOREIGN

230-562-0100

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.
MAIN DIMENSIONS	DIAMETER:2 M
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

230-562-0200

EQUIPMENT TYPE	DISC VALVE
SERVICE	FOR EP.
MAIN DIMENSIONS	DIAMETER:2 M
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

240-----0

EQUIPMENT TYPE	FLUE DUST HANDLING AREA

240-140-0100

EQUIPMENT TYPE	LAUNDER
TYPE	
SERVICE	FOR FLUE DUST
DIMENSIONS	L:40000 MM W:500 MM DEPTH:500 MM
MATERIAL	CONCRETE 7 M3, STEEL COVERS
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR FOR WHB DUST
TYPE	WITH SCREEN
CAPACITY	15 T/H
MAIN DIMENSIONS	LENGTH 40000 MM
	WIDTH 800 MM
WEIGHT	APPROX. 22T
MOTOR NO./RATING (KW)	***240-168-0100-M1 *** 5,5 ***
MOTOR TITLE	DRAG CONVEYOR FOR WHB DUST
MANUFACTURER	FOREIGN

240-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW)	***240-168-0200-M1 *** 3 ***
MOTOR TITLE	DRAG CONVEYOR FOR EP DUST
MANUFACTURER	FOREIGN

240-168-0300

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM
	WIDTH 500 MM
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW)	***240-168-0300-M1 *** 3 ***
MOTOR TITLE	DRAG CONVEYOR FOR EP DUST
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-168-0400

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM WIDTH 500 MM
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW) MOTOR TITLE	***240-168-0400-M1 *** 3 *** DRAG CONVEYOR FOR EP DUST
MANUFACTURER	FOREIGN

240-168-0500

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
CAPACITY	5 T/H
MAIN DIMENSIONS	LENGTH 20000 MM WIDTH 500 MM
WEIGHT	APPROX. 7 T
MOTOR NO./RATING (KW) MOTOR TITLE	***240-168-0500-M1 *** 3 *** DRAG CONVEYOR FOR EP DUST
MANUFACTURER	FOREIGN

240-209-0100

EQUIPMENT TYPE	WATER LOCK
TYPE SERVICE	WITH WATER NOZZLES FOR WHB DUST
VOLUME WEIGHT	1 M3 APPROX. 0,5 T
MATERIAL	STAINLESS STEEL
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-209-0200

EQUIPMENT TYPE	WATER LOCK
TYPE	WITH WATER NOZZLES
SERVICE	FOR EP DUST
VOLUME	1 M3
WEIGHT	APPROX. 0,5 T
MATERIAL	STAINLESS STEEL
MANUFACTURER	LOCAL

240-209-0300

EQUIPMENT TYPE	WATER LOCK
TYPE	WITH WATER NOZZLES
SERVICE	FOR EP DUST
VOLUME	1 M3
WEIGHT	APPROX. 0,5 T
MATERIAL	STAINLESS STEEL
MANUFACTURER	LOCAL

240-209-0400

EQUIPMENT TYPE	WATER LOCK
TYPE	WITH WATER NOZZLES
SERVICE	FOR EP DUST
VOLUME	1 M3
WEIGHT	APPROX. 0,5 T
MATERIAL	STAINLESS STEEL
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-209-0500

EQUIPMENT TYPE	WATER LOCK
TYPE	WITH WATER NOZZLES
SERVICE	FOR EP DUST
VOLUME	1 M3
WEIGHT	APPROX. 0,5 T
MATERIAL	STAINLESS STEEL
MANUFACTURER	LOCAL

240-374-0300

EQUIPMENT TYPE	SLURRY PUMP
I	
SERVICE	UNDERFLOW SLURRY PUMP
CAPACITY	25 M3/H
HEAD	20 M
MATERIAL	STEEL WITH RUBBER LINING
WEIGHT	APPROX. 0,8 T
MOTOR NO./RATING (KW)	***240-374-0300-M1 *** 7.5 ***
MOTOR TITLE	SLURRY PUMP
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-374-0400	
EQUIPMENT TYPE	SLURRY PUMP
SERVICE	UNDERFLOW SLURRY PUMP,STAND-BY
CAPACITY	25 M3/H
HEAD	20 M
MATERIAL	STEEL WITH RUBBER LINING
WEIGHT	APPROX. 0,8 T
MOTOR NO./RATING (Kw)	***240-374-0400-M1 *** 7.5 ***
MOTOR TITLE	SLURRY PUMP
MANUFACTURER	FOREIGN
240-376-0100	
EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW WATER FOR FLUE DUST SLURRY
CAPACITY	130 M3/H
HEAD	15 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (Kw)	***240-376-0100-M1 *** 15 ***
MOTOR TITLE	WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	OVERFLOW FOR FLUE DUST SLURRY STAND-BY
CAPACITY	130 M3/H
HEAD	15 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (Kw)	***240-376-0200-M1 *** 15 ***
MOTOR TITLE	WATER PUMP
MANUFACTURER	LOCAL

240-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW WATER PUMP TANK
VOLUME	500 M3
MATERIAL	CONCRETE WALLS,STEEL COVER CONCRETE VOLUME ABOUT 100 M3
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-532-0100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 30000 MM
MATERIAL	CONCRETE, APPROX. 370 M3
MOTOR NO./RATING (KW) MOTOR TITLE	***240-532-0100-M1 *** 3 *** THICKENER ***240-532-0100-M2 *** 3 *** THICKENER ***240-532-0100-M3 *** 0,5 *** THICKENER
MANUFACTURER	LOCAL

300-----0

EQUIPMENT TYPE	SULPHUR PLANT AREA

310-----0

EQUIPMENT TYPE	SULPHUR RECOVERING AREA

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-129-0100

EQUIPMENT TYPE	SULPHUR CONDENSING BOILER
CAPACITY	SATURATED STEAM 19 T/H (HIGH PRESS) SATURATED STEAM 8 T/H (LOW PRESS.)
PRESSURE	5,5 BAR 1,7 BAR
GAS FLOW	125000 NM3/H
TEMPERATURE	INLET 360 C OUTLET 150 C
VOLUME	HEAT TRANSFER AREA 2650 / 2650 M2
MAIN DIMENSIONS	L X W X H 24 X 7 X 4 M
MATERIAL	STEEL
WEIGHT	APPROX. BOILER 155 T SUPPORTS 145 T
MOTOR NO./RATING (KW) MOTOR TITLE	*** 310-129-0100-M1*** 110 *** CIRCULATION WATER PUMP *** 310-129-0100-M2*** 90 *** CIRCULATION WATER PUMP
MANUFACTURER	LOCAL
REMARKS	CIRCULATION PUMPS(ELECTRICAL AND TURBINE DRIVEN ARE INCLUDED)

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-129-0200

EQUIPMENT TYPE	GAS COOLING BOILER
CAPACITY	SATURATED STEAM 26 T/H
PRESSURE	5,5 BAR
GAS FLOW	130000 NM3/H
TEMPERATURE	INLET 480 C
	OUTLET 250 C
VOLUME	HEAT TRANSFER AREA 2950 M2
MAIN DIMENSIONS	L X W X H
	15 X 7 X 4 M
MATERIAL	STEEL
WEIGHT	APPROX. BOILER 180 T
	SUPPORTS 160 T
MOTOR NO./RATING (KW)	***310-129-0200 *** 110 ***
MOTOR TITLE	CIRCULATION WATER PUMP
MANUFACTURER	LOCAL
REMARKS	CIRCULATION PUMPS (ELECTRIC AND TURBINE DRIVEN) ARE INCLUDED

310-198-0100

EQUIPMENT TYPE	GAS DUCT
MANUFACTURER	

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-198-0200

EQUIPMENT TYPE	GAS DUCT
SERVICE	PROCESS GAS DUCTINGS FOR AREA 310
DIMENSIONS	LENGTH: 80 M TOT.DIAM.2M AND 2.2M
MATERIAL WEIGHT	STAINLESS STEEL WALL THICKNESS 8 MM 36 T (TOTAL, SUPPORTS EXCLUDED)
MANUFACTURER	LOCAL

310-204-0100

EQUIPMENT TYPE	STACK
SERVICE	FOR SULPHUR LINE AND POWER PLANT
HEIGHT MATERIAL	150 M CONCRETE, 2800 M3
MANUFACTURER	LOCAL

310-209-0100

EQUIPMENT TYPE	WATER LOCK
VOLUME WEIGHT	5 M3 APPROX. 5 T
MATERIAL	BODY OF MILD STEEL,LINED WITH STAINLESS STEEL
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATN8)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :AKI

CLIENT NO :
REVISION :5 DATE :22.08.85

310-209-0200

EQUIPMENT TYPE	WATER LOCK
VOLUME	5 M3
WEIGHT	APPROX. 5 T
MATERIAL	BODY OF MILD STEEL, LINED WITH STAINLESS STEEL
MANUFACTURER	LOCAL

310-209-0300

EQUIPMENT TYPE	WATER LOCK
VOLUME	5 M3
WEIGHT	APPROX. 5 T
MATERIAL	BODY OF MILD STEEL, LINED WITH STAINLESS STEEL
MANUFACTURER	LOCAL

310-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	70000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	170 C
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (KW)	***310-212-0100-M1 *** 160 ***
MOTOR TITLE	PROCESS GAS FAN
MANUFACTURER	FOREIGN
REMARKS	INVERTER REGULATED

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
CAPACITY	70000 NM3/H
PRESSURE	4 KPA
TEMPERATURE	170 C
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (KW)	***310-212-0200-M1 *** 160 ***
MOTOR TITLE	PROCESS GAS FAN
MANUFACTURER	FOREIGN
REMARKS	INVERTER REGULATED

310-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
TYPE	CENTRIFUGAL
SERVICE	FOR GAS REHEATER
CAPACITY	18000 NM3/H
PRESSURE	17 KPA
TEMPERATURE	35 C
WEIGHT	APPROX. 2,5 T
MOTOR NO./RATING (KW)	***310-212-0300-M1 *** 132 ***
MOTOR TITLE	COMBUSTION AIR FAN
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-212-0400

EQUIPMENT TYPE	COMBUSTION AIR FAN
SERVICE	FOR GAS REHEATER,STAND-BY
CAPACITY	18000 NM3/H
PRESSURE	17 KPA
TEMPERATURE	35 C
WEIGHT	APPROX. 2,5 T
MOTOR NO./RATING (KW)	***310-212-0400-M1 *** 132 ***
MOTOR TITLE	COMBUSTION AIR FAN
MANUFACTURER	LOCAL

310-212-0500

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	75000 NM3/H
PRESSURE	4.0 KPA
TEMPERATURE	140 C
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (KW)	***310-212-0500-M1 *** 160 ***
MOTOR TITLE	EXHAUST GAS FAN
MANUFACTURER	FOREIGN
REMARKS	INVERTER REGULATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-212-0600

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST GAS FAN
CAPACITY	75000 NM3/H
PRESSURE	4.0 KPA
TEMPERATURE	140 C
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (KW)	***310-212-0600-M1 *** 160 ***
MOTOR TITLE	EXHAUST GAS FAN
MANUFACTURER	FOREIGN
REMARKS	INVERTER REGULATED

310-212-0700

EQUIPMENT TYPE	COMBUSTION AIR FAN
SERVICE	FOR INCINERATOR
CAPACITY	16000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C
MOTOR NO./RATING (KW)	***310-212-0700-M1 *** 75 ***
MOTOR TITLE	COMBUSTION AIR FAN
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-213-0800

EQUIPMENT TYPE	SECONDARY AIR FAN
SERVICE	FOR INCINERATOR
CAPACITY	19000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C
MOTOR NO./RATING (KW)	***310-213-0800-M1 *** 90 ***
MOTOR TITLE	SECONDARY AIR FAN
MANUFACTURER	LOCAL

310-263-0100

EQUIPMENT TYPE	INCINERATOR
SERVICE	FOR PROCESS GAS H2S COMBUSTION
CAPACITY	INLET:145000 NM3/H OUT:180000 NM3/H
DIMENSIONS	D:4M L:13M
MANUFACTURER	LOCAL
REMARKS	INCLUDING: BRICKLINING FUEL:HEAVY FUEL OIL FUEL CONSUMPTION: 1,4 T/H TEMP:INLET/OUTLET 130/400 C

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-281-0100

EQUIPMENT TYPE	GAS REHEATER
SERVICE	FOR HOT CATALYZER
CAPACITY	GAS INLET 125000 NM3/H
	OUTLET 143000 NM3/H
TEMPERATURE	INLET/OUTLET 150/430 C
FUEL	OIL
CONSUMPTION	1.5 T/H
DIMENSIONS	D = 3 M L = 10 M
WEIGHT	APPROX. 71 T
INCLUDING	DUCT,BRICKLINING
MANUFACTURER	LOCAL

310-370-0100

EQUIPMENT TYPE	FUEL OIL PUMP
TYPE	
SERVICE	FOR GAS REHEATER
CAPACITY	1.7 M3/H
WEIGHT	APPROX.0,3 T
MOTOR NO./RATING (KW)	***310-370-0100-M1 *** 3 ***
MOTOR TITLE	FUEL OIL PUMP
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-370-0200

EQUIPMENT TYPE	FUEL OIL PUMP
SERVICE	FOR GAS REHEATER,STAND-BY
CAPACITY	1.7 M3/H
WEIGHT	APPROX. 0,2 T
MOTOR NO./RATING (Kw)	***310-370-0200-M1 *** 3 ***
MOTOR TITLE	FUEL OIL PUMP
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-370-0300

EQUIPMENT TYPE	FUEL OIL PUMP
SERVICE	FOR INCINERATOR
CAPACITY	1.7 M3/H
WEIGHT	APPROX. 0,2 T
MOTOR NO./RATING (KW)	***310-370-0300-M1 *** 3 ***
MOTOR TITLE	FUEL OIL PUMP
MANUFACTURER	LOCAL

310-374-0100

EQUIPMENT TYPE	SLURRY PUMP
SERVICE	FOR ABSORBTION TOWER (LIME STONE SLURRY)
CAPACITY	600 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***310-374-0100-M1*** 90 ***
MOTOR TITLE	SLURRY PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-374-0200

EQUIPMENT TYPE	SLURRY PUMP
II	
SERVICE	FOR ABSORBTION TOWER (LIME STONE SLURRY)
CAPACITY	800 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***310-374-0200-M1 *** 90 ***
MOTOR TITLE	SLURRY PUMP
MANUFACTURER	LOCAL

310-374-0300

EQUIPMENT TYPE	SLURRY PUMP
TYPE	FOR ABSORBTION TOWER
SERVICE	FOR ABSORBTION POWER(STAND-BY) (LIME STONE SLURRY)
CAPACITY	800 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***310-374-0300-M1 *** 90 ***
MOTOR TITLE	SLURRY PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-374-0400

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR TAILING POND OVERFLOW
CAPACITY	250 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW) MOTOR TITLE	***310-370-0400-M1 *** 30 *** WATER PUMP
MANUFACTURER	LOCAL

310-374-0500

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR TAILING POND OVERFLOW (STAND-BY)
CAPACITY	250 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW) MOTOR TITLE	***310-370-0500-M1 *** 30 *** WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-374-0600

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR SCRUBBER OUTLETWATER
CAPACITY	300 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 1,0 T
MOTOR NO./RATING (KW)	***310-370-0600-M1 *** 30 ***
MOTOR TITLE	WATER PUMP
MANUFACTURER	LOCAL

310-374-0700

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR SCRUBBER OUTLETWATER (STAND-BY)
CAPACITY	300 M3/H
PRESSURE	300 KPA
WEIGHT	APPROX. 1,0 T
MOTOR NO./RATING (KW)	***310-370-0700-M1 *** 30 ***
MOTOR TITLE	WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-376-0100

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER
CAPACITY	50 M3/H
PRESSURE	600 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***310-376-0100-M1 *** 15 ***
MOTOR TITLE	WATER PUMP
MANUFACTURER	LOCAL

310-376-0200

EQUIPMENT TYPE	WATER PUMP
SERVICE	FOR GAS SCRUBBER(STAND-BY)
CAPACITY	50 M3/H
PRESSURE	600 KPA
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***310-376-0200-M1 *** 15 ***
MOTOR TITLE	WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-420-0100

EQUIPMENT TYPE	DEMISTER
CAPACITY	125000 NM3/H
TEMPERATURE	150 C
DIMENSIONS	DIAMETER 7000 MM,HEIGHT 12000 MM DEMISTER BED: HEIGHT 150 MM
MATERIAL	CARBON STEEL,BED OF ACIDPROOF STEEL
WEIGHT	APPROX. 52 T (SUPPORTS INCL.)
MANUFACTURER	LOCAL

310-420-0200

EQUIPMENT TYPE	DEMISTER
CAPACITY	143000 NM3/H
TEMPERATURE	135 C
DIMENSIONS	DIAMETER 7000 MM, HEIGHT 8000 MM DEMISTER BED : HEIGHT 150 MM
MATERIAL	BED MATERIAL : ACID PROOF STEEL
WEIGHT	APPROX. 30 T (SUPPORTS INCL.)
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-423-0100

EQUIPMENT TYPE	SCRUBBER
SERVICE	FOR PROCESS GAS CLEANING
CAPACITY	180000 NM3/H
GAS TEMPERATURE	INLET 400 C OUTLET 50 C
MAIN DIMENSIONS	DIAMETER 2500 MM HEIGHT 10000 MM
MATERIAL	STAINLESS AND ACID PROOF STEEL
WEIGHT	APPROX. 27 T
MANUFACTURER	LOCAL

310-423-0200

EQUIPMENT TYPE	ABSORBTION TOWER
CAPACITY	200 000 NM3/H
GAS TEMPERATURE	60 DEG.
MAIN DIMENSIONS	DIAM: 4800 MM, HEIGHT:12000 MM
MATERIAL CONSTRUCTION	BODY:CARBON STEEL LINING:ACID PROOF STEEL
WEIGHT	APPROX. 180 T
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-431-0100

EQUIPMENT TYPE	AGGLOMERATOR
CAPACITY	125 000 NM3/H
TEMPERATURE	150 C
DIMENSIONS	DIAMETER 3700 MM HEIGHT APPR. 2000 MM AGGLOMERATOR BED: HEIGHT 100 MM
MATERIAL	BED:ACIDPROOF STEEL,BODY:CARB.STEEL
WEIGHT	APPROX. 25 T
MANUFACTURER	LOCAL

310-433-0100

EQUIPMENT TYPE	HOT CATALYZER
CAPACITY	143000 NM3/H
TEMPERATURE	480 C
NO.OF CELLS	14
VOLUME	EFFICIENT MASS VOLUME 730 M3
DIMENSIONS	MAIN DIM. L X W X H : 22 X 8,5 X 15 M CELL : 1 X 8 X 6,5 M
MATERIAL	STAINLESS STEEL
WEIGHT	APPROX. 300 T
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-433-0200

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	75000 NM3/H
TEMPERATURE	250 C (INLET)
NO.OF CELLS	14
VOLUME	EFFICIENT MASS VOLUME 730 M3
DIMENSIONS	MAIN DIM. L X W X H : 22 X 8,5 X 15 M CELL : 1 X 8 X 6,5 M
MATERIAL	STEEL
WEIGHT	APPROX. 300 T
MANUFACTURER	LOCAL

310-433-0300

EQUIPMENT TYPE	COLD CATALYZER
CAPACITY	75000 NM3/H
TEMPERATURE	250 C (INLET)
NO.OF CELLS	14
VOLUME	EFFICIENT MASS VOLUME 730 M3
DIMENSIONS	MAIN DIM. L X W X H : 22 X 8,5 X 15 M CELL : 1 X 8 X 6,5 M
MATERIAL	STEEL
WEIGHT	APPROX. 300 T
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-464-0100

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
CAPACITY	SULPHUR FLOW : 650 T/H
GAS FLOW	75000 NM3/H
TEMPERATURE	INLET 260 C OUTLET 135 C
DIMENSIONS	DIAMETER 9000 MM HEIGHT 12000 MM
MATERIAL	STEEL
WEIGHT	APPROX. 260 T
MANUFACTURER	FOREIGN

310-464-0200

EQUIPMENT TYPE	SULPHUR CONDENSING TOWER
CAPACITY	SULPHUR FLOW : 650 T/H
GAS FLOW	75000 NM3/H
TEMPERATURE	INLET 260 C OUTLET 135 C
DIMENSIONS	DIAMETER 9000 MM HEIGHT 12000 MM
MATERIAL	STEEL
WEIGHT	APPROX. 260 T
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-516-0100	
EQUIPMENT TYPE	MIXING TANK
SERVICE	FOR ABSORBTION TOWER
CAPACITY	100 M3/H
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 10 T
MOTOR NO./RATING (Kw)	***310-516-0100-M1 *** 37 ***
MOTOR TITLE	MIXING TANK
MANUFACTURER	LOCAL
310-516-0100	
EQUIPMENT TYPE	PUMP TANK
SERVICE	FOR SCRUBBER OUTLET WATER
CAPACITY	100 M3
WEIGHT	APPROX. 10 T
MATERIAL	MILD STEEL
MANUFACTURER	LOCAL
320-----0	
EQUIPMENT TYPE	SULPHUR HANDLING AREA

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-117-0100

EQUIPMENT TYPE	BIN
SERVICE	LIME BIN
VOLUME	5 M3
MATERIAL	STEEL
WEIGHT	APPROX. 1 T
MANUFACTURER	LOCAL

320-129-0100

EQUIPMENT TYPE	SULPHUR COOLING BOILER
TYPE	NATURAL CIRCULATION
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR
GAS FLOW	CIRCULATING SULPHUR FLOW 860 T/H
TEMPERATURE	INLET 133 C OUTLET 123 C
VOLUME	HEAT TRANSFER AREA 650 M2
WEIGHT	APPROX. 35 T
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-129-0200

EQUIPMENT TYPE	SULPHUR COOLING BOILER
TYPE	NATURAL CIRCULATION
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR
GAS FLOW TEMPERATURE	CIRCULATING SULPHUR FLOW 860 T/H INLET 133 C OUTLET 123 C
VOLUME	HEAT TRANSFER AREA 650 M2
WEIGHT	APPROX. 35 T
MANUFACTURER	FOREIGN

320-129-0300

EQUIPMENT TYPE	SULPHUR COOLING BOILER
TYPE	NATURAL CIRCULATION
CAPACITY	SATURATED STEAM 3,5 T/H
PRESSURE	1,7 BAR
GAS FLOW TEMPERATURE	CIRCULATING SULPHUR FLOW 860 T/H INLET 133 C OUTLET 123 C
VOLUME	HEAT TRANSFER AREA 650 M2
WEIGHT	APPROX. 35 T
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM WIDTH 650 MM
BELT INCLINE	HORIZONTAL
WEIGHT	APPROX. 5 T
MOTOR NO./RATING (KW)	***320-167-0100-M1 *** 5,5 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

320-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLING TOWER
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 40000 MM WIDTH 650 MM
BELT INCLINE	HORIZONTAL
WEIGHT	APPROX. 5 T
MOTOR NO./RATING (KW)	***320-167-0200-M1 *** 5,5 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	FOR PRILLED SULPHUR
CAPACITY	150 T/H
MAIN DIMENSIONS	LENGTH 80000 MM WIDTH 650 MM
BELT INCLINE	6 DEGREES
WEIGHT	APPROX. 8 T
INCLUDING	BELT SCALE
MOTOR NO./RATING (KW)	***320-167-0300-M1 *** 11 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTUFER	LOCAL

320-172-0100

EQUIPMENT TYPE	SCREW CONVEYOR
SERVICE	FOR LIME
CAPACITY	0-200 KG/H
MAIN DIMENSIONS	LENGTH: 4000 MM
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-172-0100-M1 *** 0,75 ***
MOTOR TITLE	SCREW CONVEYOR
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

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
WEIGHT	APPROX.0,5 T
MOTOR NO./RATING (KW)	***320-212-0100-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN
MANUFACTURER	LOCAL

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
WEIGHT	APPROX.0,5 T
MOTOR NO./RATING (KW)	*** 320-212-0200-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN
MANUFACTURER	LOCAL

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
WEIGHT	APPROX.0,5 T
MOTOR NO./RATING (KW)	*** 320-212-0300-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN
MANUFACTURER	LOCAL

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
WEIGHT	APPROX.0,5 T
MOTOR NO./RATING (KW)	*** 320-212-0400-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-214-0100

EQUIPMENT TYPE	AIR BLOWER
TYPE	CENTRIFUGAL
SERVICE	FOR PRILLING TOWER
CAPACITY	2000 NM3/H
PRESSURE	10 KPA
TEMPERATURE	35 C
WEIGHT	APPROX. 0,4 T
MOTOR NO./RATING (KW)	***320-214-0100-M1 *** 11 ***
MOTOR TITLE	AIR BLOWER
MANUFACTURER	LOCAL

320-244-0100

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER
SERVICE	FOR SULPHUR
VOLUME	10 M3
DIMENSIONS	L X W X H : 8 X 2 X 0,65 M
WEIGHT	APPROX.CONCRETE 8 M3,STEEL 4 T
MATERIAL	CONCRETE,STEEL COVER STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	STEAM HEATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-244-0200

EQUIPMENT TYPE	GRAVITY FILTER
TYPE	GLASS WOOL FILTER(STEAM HEATED)
SERVICE	FOR SULPHUR
VOLUME	10 M3
DIMENSIONS	L X W X H : 8 X 2 X 0,65 M
WEIGHT	APPROX.CONCRETE 8 M3,STEEL 4 T
MATERIAL	CONCRETE STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	STEAM HEATED

320-370-0100

EQUIPMENT TYPE	PUMP
I	
TYPE	SULPHUR PUMP
SERVICE	FROM PUMP TANK TO GRAVITY FILTER
CAPACITY	25 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-0100-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-0200

EQUIPMENT TYPE	PUMP
I	
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FROM PUMP TANK TO GRAVITY FILTER
CAPACITY	25 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (Kw)	***320-370-0200-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-0300

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP
SERVICE	FROM PUMP TANK TO CIRCULATION TANK
CAPACITY	50 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,7 T
MOTOR NO./RATING (KW)	***320-370-0300-M1 *** 18,5 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-0400

EQUIPMENT TYPE	PUMP
I	
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FROM PUMP TANK TO CIRCULATION TANK
CAPACITY	50 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,7 T
MOTOR NO./RATING (KW)	***320-370-0400-M1 *** 18,5 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-0500

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP
SERVICE	FROM PUMP TANK TO CIRCULATION TANK
CAPACITY	5 M3/H
HEAD	25 M
WEIGHT	APPROX.0,3
MOTOR NO./RATING (KW)	***32 ** 3 ***
MOTOR TITLE	SULPH
MANUFACTURER	FOREI
REMARKS	STEAM HEA

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-0600

EQUIPMENT TYPE	PUMP
I	
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FROM PUMP TANK TO CIRCULATION TANK
CAPACITY	5 M3/H
HEAD	25 M
WEIGHT	APPROX.0,3 T
MOTOR NO./RATING (KW)	***320-370-0600-M1 *** 3 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-0700

EQUIPMENT TYPE	PUMP
I	
TYPE	SULPHUR PUMP
SERVICE	FROM CIRCULATION TANK TO AGGLOMERATOR BED WASH
CAPACITY	25 M3/H
HEAD	35 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-0700-M1 *** 15 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-0800

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FROM CIRCULATION TANK TO AGGLOMERATOR BED WASH
CAPACITY	25 M3/H
HEAD	35 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-0800-M1 *** 15 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-0900

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP
SERVICE	FROM CIRCULATION TANK TO SULPHUR TANK
CAPACITY	25 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-0900-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-1000

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FROM CIRCULATION TANK TO SULPHUR TANK
CAPACITY	25 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-1000-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-1100

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP
SERVICE	FOR AUTOCLAVES
CAPACITY	25 M3/H
HEAD	35 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-1100-M1 *** 15 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-1200

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FOR AUTOCLAVES
CAPACITY	25 M3/H
HEAD	35 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-1200-M1 *** 15 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-1300

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP
SERVICE	FROM PUMP TANK TO SULPHUR DAY TANK
CAPACITY	25 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-1300-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-1400

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR PUMP (STAND BY)
SERVICE	FROM PUMP TANK TO SULPHUR DAY TANK
CAPACITY	25 M3/H
HEAD	25 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***320-370-1400-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP
MANUFACTUFER	FOREIGN
REMARKS	STEAM HEATED

320-370-1500

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR CIRCULATION PUMP
SERVICE	FOR SULPHUR COOLING BOILER
CAPACITY	240 M3/H
HEAD	40 M
WEIGHT	APPROX. 1,3 T
MOTOR NO./RATING (Kw)	***320-370-1500-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP
MANUFACTUFER	FOREIGN
REMARKS	STEAM HEATED

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-1600

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR CIRCULATION PUMP
SERVICE	FOR SULPHUR COOLING BOILER
CAPACITY	240 M3/H
HEAD	40 M
WEIGHT	APPROX. 1,3 T
MOTOR NO./RATING (KW)	***320-370-1600-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-1700

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR CIRCULATION PUMP
SERVICE	FOR SULPHUR COOLING BOILER
CAPACITY	240 M3/H
HEAD	40 M
WEIGHT	APPROX. 1,3 T
MOTOR NO./RATING (KW)	***320-370-1700-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-1800

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR CIRCULATION PUMP
SERVICE	FOR SULPHUR COOLING BOILER
CAPACITY	240 M3/H
HEAD	40 M
WEIGHT	APPROX. 1,3 T
MOTOR NO./RATING (KW)	***320-370-1800-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-1900

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR CIRCULATION PUMP
SERVICE	FOR SULPHUR COOLING BOILER
CAPACITY	240 M3/H
HEAD	40 M
WEIGHT	APPROX. 1,3 T
MOTOR NO./RATING (Kw)	***320-370-1900-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-2000

EQUIPMENT TYPE	PUMP
TYPE	SULPHUR CIRCULATION PUMP
SERVICE	FOR SULPHUR COOLING BOILER
CAPACITY	240 M3/H
HEAD	40 M
WEIGHT	APPPROX. 1,3 T
MOTOR NO./RATING (Kw)	***320-370-2000-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-370-2300

EQUIPMENT TYPE	PUMP
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA
WEIGHT	APPROX. 1 T
MOTOR NO./RATING (Kw)	***320-370-2300-M1 *** 37 ***
MOTOR TITLE	SULPHUR PRILLING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-2400

EQUIPMENT TYPE	PUMP
TYPE	STAND BY
SERVICE	SULPHUR PRILLING PUMP
CAPACITY	22 M3/H
PRESSURE	1600 KPA
WEIGHT	APPROX. 1 T
MOTOR NO./RATING (KW)	***320-370-2400-M1 *** 37 ***
MOTOR TITLE	SULPHUR PRILLING PUMP
MANUFACTURER	FOREIGN
REMARKS	STEAM HEATED

320-371-0100

EQUIPMENT TYPE	DOSAGE PUMP
TYPE	PISTON TYPE
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA
WEIGHT	APPROX. 0,1 T
MOTOR NO./RATING (KW)	***320-371-0100-M1 *** 1,5 ***
MOTOR TITLE	DOSAGE PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-371-0200

EQUIPMENT TYPE	DOSAGE PUMP
TYPE	PISTON TYPE
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA
WEIGHT	APPROX.0,1 T
MOTOR NO./RATING (KW)	***320-371-0200-M1 *** 1,5 ***
MOTOR TITLE	DOSAGE PUMP
MANUFACTURER	LOCAL

320-371-0300

EQUIPMENT TYPE	DOSAGE PUMP
TYPE	STAND BY
SERVICE	FOR LIME MILK
CAPACITY	0-2,5 M3/H
PRESSURE	400 KPA
WEIGHT	APPROX. 0,1 T
MOTOR NO./RATING (KW)	***320-371-0300-M1 *** 1,5 ***
MOTOR TITLE	DOSAGE PUMP
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
SERVICE	FOR PRILLED SULPHUR
CAPACITY	150 T/H
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***320-411-0100-M1 *** 15 ***
MOTOR TITLE	VIBRATING SCREEN
MANUFACTURER	LOCAL

320-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
SERVICE	FOR PRILLED SULPHUR
CAPACITY	150 T/H
MATERIAL	CARBON STEEL
WEIGHT	APPPROX. 2 T
MOTOR NO./RATING (KW)	***320-411-0200-M1 *** 15 ***
MOTOR TITLE	VIBRATING SCREEN
MANUFACTURER	LOCAL

320-509-0100

EQUIPMENT TYPE	PRILLING TOWER
SERVICE	SULPHUR PRILLING TOWER
DIMENSIONS	DIAMETER 30000 MM, HEIGHT 40000 MM WALL THICKNESS 300 MM
MATERIAL	CONCRETE APPROX. 1500 M3
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-511-0100

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 30 T/H
VOLUME	26 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)
FLOW RATE	STEAM 0,8 T/H PRESSURE 5,5 BAR LIME MILK 2,0 M3/H
MAIN DIMENSIONS	D = 1.5 M L = 15 M
MATERIAL	ACID PROOF STEEL
WEIGHT	AUTOCLAVE&TANKS:7T,SUPPORTS:5T
MOTOR NO./RATING (KW) MOTOR TITLE	***320-511-0100-M1 *** 3 *** AUTOCLAVE ***320-511-0100-M2 *** 3 *** AUTOCLAVE
MANUFACTURER	FOREIGN
REMARKS	INCLUDING: AGITATORS,SEPARATORS, TANKS.

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-511-0200

EQUIPMENT TYPE	AUTOCLAVE
SERVICE	SULPHUR WASHING
CAPACITY	SULPHUR 30 T/H
VOLUME	26 M3
TEMPERATURE	130 C (AUTOCLAVE)
PRESSURE	3,5 BAR (AUTOCLAVE)
FLOW RATE	STEAM 0,8 T/H PRESSURE 5,5 BAR LIME MILK 2,0 M3/H
MAIN DIMENSIONS	D = 1.5 M L = 15 M
MATERIAL	ACID PROOF STEEL
WEIGHT	AUTOCLAVE&TANKS:7T,SUPPORTS:5T
MOTOR NO./RATING (KW) MOTOR TITLE	***320-511-0100-M1 *** 3 *** AUTOCLAVE ***320-511-0100-M2 *** 3 *** AUTOCLAVE
MANUFACTURER	FOREIGN
REMARKS	INCLUDING: AGITATORS, SEPARATORS, TANKS.

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-515-0100

EQUIPMENT TYPE	MEASURING TANK
SERVICE	SULPHUR MEASURING TANK
VOLUME	2 X 6 M3
WEIGHT	APPROX. 12 T
MATERIAL	CONCRETE, 4 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING VALVES AND STEEL COVERS

320-516-0100

EQUIPMENT TYPE	MIXING TANK
SERVICE	FOR LIME MILK
VOLUME	25 M3
MATERIAL	STEEL
WEIGHT	APPROX. 4 T
MOTOR NO./RATING (KW)	***320-516-0100-M1 *** 4 ***
MOTOR TITLE	MIXING TANK
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	LIQUID SULPHUR CIRCULATING TANK
CAPACITY	2500 T/H
VOLUME	95 M3
MATERIAL	CONCRETE, APPR. 30 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

320-518-0200

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK FOR SULPHUR CONDENSING BOILERS
VOLUME	18 M3
MATERIAL	CONCRETE, 6 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-518-0300

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK FOR DEMISTER
VOLUME	18 M3
MATERIAL	CONCRETE, 6 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

320-518-0400

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK FOR EXHAUST GAS FANS
VOLUME	10 M3
MATERIAL	CONCRETE, 3 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-518-0500

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK FOR AUTOCLAVES
VOLUME	18 M3
MATERIAL	CONCRETE, 6 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

320-518-0600

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK FOR SULPHUR DAY TANK
VOLUME	18 M3
MATERIAL	CONCRETE 6 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-516-0700

EQUIPMENT TYPE	PUMP TANK
SERVICE	SULPHUR PUMP TANK FOR SULPHUR PRILLING
VOLUME	18 M3
MATERIAL	CONCRETE, 6 M3 STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

320-519-0100

EQUIPMENT TYPE	TANK
SERVICE	SULPHUR TANK FOR AUTOCLAVES FEED TANK
VOLUME	100 M3
WEIGHT	APPROX. 92 T
MATERIAL	STEEL STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-519-0200

EQUIPMENT TYPE	DAY TANK
SERVICE	SULPHUR DAY TANK
VOLUME	400 M3
WEIGHT	APPROX. 240 T
MATERIAL	STEEL STEAM HEATING PIPES
MANUFACTURER	LOCAL
REMARKS	INCLUDING STEEL COVERS

330-----0

EQUIPMENT TYPE	WASTE LIQUID HANDLING AREA

330-212-0100

EQUIPMENT TYPE	FAN
TYPE	CENTRIFUGAL
SERVICE	EXHAUST GAS FAN
CAPACITY	5000 NM3/H
PRESSURE	500 PA
MATERIAL	CARBON STEEL,RUBBER LINED
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***330-212-0100-M1 *** 5,5 ***
MOTOR TITLE	EXHAUST GAS FAN
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

330-243-0100

EQUIPMENT TYPE	DRUM FILTER
SERVICE	FOR ARSENIC PRECIPITATE
FILTER AREA	4,5 M2
WEIGHT	APPROX. 1 T
MATERIAL	ACID PROOF STEEL
MOTOR NO./RATING (KW)	***330-243-0100-M1 *** 1,1 ***
MOTOR TITLE	DRUM FILTER
	***330-243-0100-M2 *** 0,75 ***
	DRUM FILTER
MANUFACTURER	LOCAL
REMARKS	VACUUM: 500 MM HG

330-370-0100

EQUIPMENT TYPE	PUMP
SERVICE	UNDERFLOW PUMP FOR SULPHUR WASHING WASTE WATER THICKENER
CAPACITY	2 M3/H
HEAD	15 M
WEIGHT	APPROX. 0,2 T
MOTOR NO./RATING (KW)	***330-370-0100-M1 *** 2,2 ***
MOTOR TITLE	UNDERFLOW PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

330-370-0200

EQUIPMENT TYPE	PUMP
SERVICE	UNDERLOW PUMP FOR SULPHUR WASHING WASTE WATER THICKENER
CAPACITY	2 M3/H
HEAD	15 M
WEIGHT	APPRCX. 0,2 T
MOTOR NO./RATING (KW)	***330-370-0200-M1 *** 2,2 ***
MOTOR TITLE	UNDERFLOW PUMP
MANUFACTURER	LOCAL

330-370-0300

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP FOR SULPHUR WASHING WASTE WATER THICKENER
CAPACITY	15 M3/H
HEAD	20 M
WEIGHT	APPRCX. 0,2 T
MOTOR NO./RATING (KW)	***330-370-0300-M1 *** 2,2 ***
MOTOR TITLE	OVERFLOW PUMP
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

330-370-0400

EQUIPMENT TYPE	PUMP
SERVICE	OVERFLOW PUMP FOR SULPHUR WASHING WASTE WATER THICKENER
CAPACITY	15 M3/H
HEAD	20 M
WEIGHT	APPROX. 0,2 T
MOTOR NO./RATING (Kw)	***330-370-0400-M1 *** 2,2 ***
MOTOR TITLE	OVERFLOW PUMP
MANUFACTURER	LOCAL

330-375-0100

EQUIPMENT TYPE	VACUUM PUMP
CAPACITY	4,5 M3/MIN
VACUUM	UNDER PRESSURE 600 MM HG
WEIGHT	APPROX. 0,2 T
MOTOR NO./RATING (Kw)	***330-375-0100-M1 *** 11 ***
MOTOR TITLE	VACUUM PUMP
MANUFACTURER	LOCAL

330-510-0100

EQUIPMENT TYPE	TANK
SERVICE	COOLING TANK FOR WASTE LIQUID
VOLUME	5 M3
WEIGHT	APPROX. 1 T
MATERIAL	ACID PROOF STEEL
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

330-510-0200

EQUIPMENT TYPE	TANK
SERVICE	SULPHURIC ACID TANK
VOLUME	3 M3
WEIGHT	APPROX. 0,8 T
MATERIAL	CARBON STEEL
MANUFACTURER	LOCAL

330-518-0100

EQUIPMENT TYPE	PUMP TANK
SERVICE	UNDERFLOW PUMP TANK
VOLUME	5 M3
WEIGHT	APPROX. 0,7 T
MATERIAL	ACID PROOF STEEL
MANUFACTURER	FOREIGN

330-518-0200

EQUIPMENT TYPE	PUMP TANK
SERVICE	OVERFLOW PUMP TANK
VOLUME	15 M3
WEIGHT	APPROX. 2,0 T
MATERIAL	ACID PROOF STEEL
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

330-521-0100

EQUIPMENT TYPE	REACTOR TANK
VOLUME	3 M3
WEIGHT	APPROX. 3,5 T
MATERIAL	STEEL BRICKLINING AND RUBBER LINING
MANUFACTURER	LOCAL

330-532-0100

EQUIPMENT TYPE	THICKENER
DIMENSIONS	DIAMETER 3500 MM
VOLUME	5 M3
MATERIAL	STEEL ,RUBBERIZED
WEIGHT	APPROX. 4 T
MOTOR NO./RATING (KW)	***330-532-0100-M1 *** 2 ***
MOTOR TITLE	THICKENER ***330-532-0100-M2 *** 0,75 *** THICKENER
MANUFACTURER	LOCAL

500-----0

EQUIPMENT TYPE	COAL PLANT AREA

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-118-0100

EQUIPMENT TYPE	STORAGE BIN
SERVICE	RAW COAL STORAGE BIN
CAPACITY	400 M3
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 60 T
MANUFACTURER	LOCAL

500-118-0200

EQUIPMENT TYPE	STORAGE BIN
SERVICE	RAW COAL STORAGE BIN
VOLUME	400 M3
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 60 T
MANUFACTURER	LOCAL

500-118-0300

EQUIPMENT TYPE	STORAGE BIN
SERVICE	FOR PULVERIZED COAL
CAPACITY	400 M3
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 60 T
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

500-118-0400

EQUIPMENT TYPE	STORAGE BIN
SERVICE	FOR SUPERHEATER COAL
CAPACITY	20 M3
MATERIAL	CARBON STEEL
WEIGHT	APPROX. 6 T
MANUFACTURER	LOCAL

500-133-0100

EQUIPMENT TYPE	OIL BURNER
SERVICE	START UP BURNER FOR AIR PREHEATER
WEIGHT	APPROX. 0,5 T
MANUFACTURER	LOCAL

500-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
SERVICE	RAW COAL TRANSPORT TO STORAGE BINS
CAPACITY	200 T/H
MAIN DIMENSIONS	LENGTH: 75 M
BELT WIDTH	800 MM
BELT INCLINE	12 DEGREES
WEIGHT	APPROX. 6 T
MOTOR NO./RATING (KW)	***500-167-0100-M1 *** 45 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
TYPE	REVERSIBLE
SERVICE	RAW COAL TRANSPORT TO STORAGE BINS
CAPACITY	200 T/H
MAIN DIMENSIONS	LENGTH: 9000 MM
BELT WIDTH	800 MM
BELT INCLINE	NONE
WEIGHT	APPROX. 1 T
MOTOR NO./RATING (KW)	***500-167-0200-M1 *** 7.5 ***
MOTOR TITLE	BELT CONVEYOR
MANUFACTURER	LOCAL

500-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
SERVICE	TRANSPORT OF PULVERIZED COAL TO FEED BINS
INCLUDING	FEEDERS,PIPING,DUST SEPARATION EQ.
CAPACITY	30 T/H
WEIGHT	APPROX. 8 T
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :36C 100 900 001 ALT1
DESIGN :AKI

CLIENT NO :
REVISION :5 DATE :22.08.85

500-170-0200

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
SERVICE	TRANSPORT OF PULVERIZED COAL TO COAL BURNERS OF SUPERHEATER
INCLUDING	BIN DISCHARGERS,ROTOR SCALES, PIPING
CAPACITY	5 T/H
WEIGHT	APPROX. 8 T
MANUFACTURER	FOREIGN

500-179-0100

EQUIPMENT TYPE	COAL INJECTION SYSTEM
SERVICE	COAL INJECTION TO FLASH SMELTING FURNACE
INCLUDING	STORAGE INJECTORS,BIN DISCHARGERS PRIMARY INJECTORS,TUYERS,BINS
CAPACITY	25 T/H
WEIGHT	APPROX. 12 T
MANUFACTURER	FOREIGN

500-202-0100

EQUIPMENT TYPE	FEED HOPPER
SERVICE	RAW COAL FEED
VOLUME	20 M3
WEIGHT	APPROX. 1,5 T
MATERIAL	CARBON STEEL
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-212-0100

EQUIPMENT TYPE	FAN
TYPE	CENTRIFUGAL
SERVICE	HOT AIR SYSTEM FOR MILLS
WEIGHT	APPROX. 0,6 T
MOTOR NO./RATING (Kw)	*** 500-212-0100-M1*** 30 ***
MOTOR TITLE	FAN
MANUFACTURER	

500-212-0200

EQUIPMENT TYPE	FAN
TYPE	CENTRIFUGAL
SERVICE	EXHAUST FAN
CAPACITY	GAS FLOW: 80 000 NM3 PRESSURE: 7 KPA
WEIGHT	APPROX. 5 T
MOTOR NO./RATING (Kw)	*** 500-212-0200-M1*** 250 ***
MOTOR TITLE	FAN
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-212-0300

EQUIPMENT TYPE	EXHAUST AIR FAN
SERVICE	FOR PNEUMATIC CONVEYOR SYSTEM
WEIGHT	APPROX. 0,3 T
MOTOR NO./RATING (KW)	***500-212-030-M1 ***- 22 ***
MOTOR TITLE	FAN
MANUFACTURER	FOREIGN

500-212-0400

EQUIPMENT TYPE	FAN
SERVICE	EXHAUST AIR FAN FOR PNEUMATIC CONVEYOR SYSTEM.
WEIGHT	APPROX. 0,2 T
MOTOR NO./RATING (KW)	***500-212-0400-M1 *** 11 ***
MANUFACTURER	FOREIGN

500-216-0100

EQUIPMENT TYPE	AIR LOCK FEEDER
SERVICE	COAL BIN DISCHARGER
CAPACITY	MATERIAL FLOW: 30 T/H
WEIGHT	APPROX. 0,1 T
MOTOR NO./RATING (KW)	***500-216-0100-M1 *** 2,2 ***
MOTOR TITLE	AIR LOCK FEEDER
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

500-216-0200

EQUIPMENT TYPE	AIR LOCK FEEDER
SERVICE	COAL BIN DISCHARGER
CAPACITY	MATERIAL FLOW: 30 T/H
WEIGHT	APPROX. 0,1 T
MOTOR NO./RATING (KW)	***500-216-0200-M1 *** 2,2 ***
MOTOR TITLE	AIR LOCK FEEDER
MANUFACTURER	LOCAL

500-218-0100

EQUIPMENT TYPE	BELT FEEDER
SERVICE	RAW COAL FEED
CAPACITY	200 T/H
BELT LENGTH	5000 MM
BELT WIDTH	1000 MM
BELT INCLINE	HORIZONTAL
WEIGHT	APPROX. 3,5 T
MOTOR NO./RATING (KW)	***500-216-0100-M1 *** 7.5 ***
MOTOR TITLE	BELT FEEDER
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-223-0100

EQUIPMENT TYPE	DRAG FEEDER
SERVICE	FEEDING COAL MILL
CAPACITY	6...30 T/H
MAIN DIMENSIONS	LENGTH: 6000 MM WIDTH: 1000 MM
WEIGHT	APPROX. 5 T
MOTOR NO./RATING (KW) MOTOR TITLE	***500-223-0100-M1 *** 7,5 *** DRAG FEEDER
MANUFACTURER	FOREIGN

500-223-0200

EQUIPMENT TYPE	DRAG FEEDER
SERVICE	FEEDING COAL MILL,STAND-BY
CAPACITY	6...30 T/H
MAIN DIMENSIONS	LENGTH: 6000 MM WIDTH: 1000 MM
WEIGHT	APPROX. 5 T
MOTOR NO./RATING (KW) MOTOR TITLE	***500-223-0200-M1 *** 7,5 *** DRAG FEEDER
MANUFACTURER	FOREIGN

500-281-0100

EQUIPMENT TYPE	PREHEATER
TYPE	AIR PREHEATER
SERVICE	HOT AIR SYSTEM FOR MILLS
MATERIAL	STEEL MANTLE,REFRACTORY CASTABLE
WEIGHT	APPROX. 4 T (TOTAL)
MANUFACTURER	FOREIGN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

500-325-0100

EQUIPMENT TYPE	MILL
SERVICE	COAL MILL
CAPACITY	30 T/H
WEIGHT	APPROX. 35 T
CONSTRUCTION	VERTICAL POSITION
MOTOR NO./RATING (KW)	***500-325-0100-M1 *** 315 ***
MOTOR TITLE	MILL
MANUFACTURER	FOREIGN

500-325-0200

EQUIPMENT TYPE	MILL
SERVICE	COAL MILL (STAND BY)
CAPACITY	30 T/H
WEIGHT	APPROX. 35 T
CONSTRUCTION	VERTICAL POSITION
MOTOR NO./RATING (KW)	***500-325-0200-M1 *** 315 ***
MOTOR TITLE	MILL
MANUFACTURER	FOREIGN

500-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
SERVICE	FOR PULVERIZED COAL
CAPACITY	30 T/H
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***500-411-0100-M1 *** 2,2 ***
MOTOR TITLE	VIBRATING SCREEN
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
SERVICE	FOR PULVERIZED COAL
CAPACITY	30 T/H
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***500-411-0200-M1 *** 2,2 ***
MOTOR TITLE	VIBRATING SCREEN
MANUFACTURER	FOREIGN

500-417-0100

EQUIPMENT TYPE	BAG FILTER
SERVICE	COAL DUST SEPARATION
WEIGHT	APPROX. 5,5 T
MANUFACTURER	FOREIGN

500-419-0100

EQUIPMENT TYPE	CYCLONE
SERVICE	FOR COAL DUST SEPARATION
WEIGHT	APPROX. 3 T
MANUFACTURER	FOREIGN

600-----0

EQUIPMENT TYPE	POWER PLANT AREA

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

CLIENT NO :
REVISION :5 DATE :22.08.85

600-122-0100

EQUIPMENT TYPE	AUXILIARY BOILER
SERVICE	HEATING OF SULPHUR PLANT IN START-UP AND SHUT-DOWN CASES
CAPACITY	SATURATED STEAM 15 T/H
WEIGHT	APPROX. 60 T
MANUFACTURER	LOCAL

600-123-0100

EQUIPMENT TYPE	SUPERHEATING BOILER
SERVICE	SUPERHEAT WASTE HEAT BOILER STEAM
CAPACITY	SUPERHEATED STEAM: 100 T/H
PRESSURE	65 BAR
TEMPERATURE	480 DEGREES C.
WEIGHT	FUEL: COAL,IN START-UP LIGHT OIL APPROX. 150 T
MANUFACTURER	LOCAL

600-276-0100

EQUIPMENT TYPE	CONDENSER
TYPE	DUMP CONDENSER
SERVICE	CONDENSING OF TURBOALTERNATOR STEAM
CAPACITY	100 T/H
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

600-280-0100

EQUIPMENT TYPE	HEAT EXCHANGER
SERVICE	PREHEATING OF BOILER FEED WATER
CAPACITY	20 T/H
MANUFACTURER	LOCAL

600-280-0200

EQUIPMENT TYPE	HEAT EXCHANGER
SERVICE	COOLING OF LOW PRESSURE(1,78AR) BOILERS FEED WATER.
CAPACITY	20 T/H
MANUFACTURER	LOCAL

600-376-0100

EQUIPMENT TYPE	CONDENSATE PUMP
SERVICE	PUMPING OF TURBOALTERNATOR CONDENSATE.
CAPACITY	100 T/H
HEAD	50 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (Kw)	***600-376-0100-M1 *** 22 ***
MOTOR TITLE	CONDENSATE PUMP
MANUFACTURER	LOCAL

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

600-376-0200

EQUIPMENT TYPE	CONDENSATE PUMP
SERVICE	PUMPING OF SULPHUR PLANT BOILER CONDENSATE.
CAPACITY	50 T/H
HEAD	50 M
WEIGHT	APPROX. 0,5 T
MOTOR NO./RATING (KW)	***600-376-0200-M1 *** 22 ***
MOTOR TITLE	CONDENSATE PUMP
MANUFACTURER	LOCAL

600-376-0300

EQUIPMENT TYPE	CONDENSATE PUMP
SERVICE	FEED WATER PUMP FOR WASTE HEAT BOILER.
CAPACITY	140 T/H
HEAD	800 M
WEIGHT	APPROX. 2 T
MOTOR NO./RATING (KW)	***600-376-0300-M1 *** 400 ***
MOTOR TITLE	CONDENSATE PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

600-376-0400

EQUIPMENT TYPE	CONDENSATE PUMP
SERVICE	FEED WATER PUMP FOR WASTE HEAT BOILER (STAND-BY)
CAPACITY	120 T/H
HEAD	800 M
WEIGHT	APPROX.1,5 T
MANUFACTURER	LOCAL
REMARKS	TURBINE DRIVEN

600-376-0500

EQUIPMENT TYPE	CONDENSATE PUMP
SERVICE	FEED WATER PUMP FOR SULPHUR PLANT BOILERS.
CAPACITY	75 T/H
HEAD	75 M
WEIGHT	APPROX.0,4 T
MOTOR NO./RATING (KW)	***600-376-0500-M1 *** 30 ***
MOTOR TITLE	FEED WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

600-376-0600

EQUIPMENT TYPE	CONDENSATE PUMP
TYPE	TURBINE DRIVEN
SERVICE	FEED WATER PUMP FOR SULPHUR PLANT BOILERS (STAND-BY)
CAPACITY	75 T/H
HEAD	75 M
WEIGHT	APPROX.0,4 T
MANUFACTURER	LOCAL

600-376-0700

EQUIPMENT TYPE	CONDENSATE PUMP
SERVICE	FEED WATER PUMP FOR AUXILIARY BOILER
CAPACITY	20 T/H
HEAD	130 M
WEIGHT	APPROX.0,4 T
MOTOR NO./RATING (KW)	***600-376-0700-M1 *** 15 ***
MOTOR TITLE	FEED WATER PUMP
MANUFACTURER	LOCAL

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

CLIENT NO :
REVISION :5 DATE :22.08.85

600-514-0100

EQUIPMENT TYPE	FEED TANK
TYPE	FEED WATER TANK
SERVICE	FOR WASTE HEAT BOILER AND SULPHUR PLANT BOILERS.
CAPACITY	VOLUME:175 M3
	PRESSURE: 5 BAR
WEIGHT	APPROX. 100 T
MANUFACTURER	LOCAL

600-556-0100

EQUIPMENT TYPE	TURBOALTERNATOR
TYPE	CONDENSATE TYPE TURBINE
SERVICE	PRODUCTION OF ELECTRIC POWER
CAPACITY	25 MW ELECTRIC POWER
MANUFACTURER	FOREIGN

CLIENT :PPCL
DOCUMENT:EQUIPMENT LIST (ATNB)
OUTOKUMPU NO :360 100 900 001 A1.T1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

700-----0

EQUIPMENT TYPE	OXYGEN PLANT AREA
MANUFACTURER	FOREIGN

800-----0

EQUIPMENT TYPE	LIME STONE SLURRY PREPARATION
MANUFACTURER	LOCAL

900-----0

EQUIPMENT TYPE	WATER TREATMENT AREA

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

CLIENT NO :
REVISION :5 DATE :22.08.85

950-----0

EQUIPMENT TYPE	COMPRESSED AIR STATION
MANUFACTURER	LOCAL

4.3.2
Motor List

In Volume II

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

CLIENT NO :
REVISION :5 DATE :22.08.85

200-----0	
EQUIPMENT TYPE	FLASH SMELTER AREA
210-----0	
EQUIPMENT TYPE	DRYER AND FSF FEED AREA
210-116-0100	
EQUIPMENT TYPE	CONCENTRATE DAY BIN
210-116-0200	
EQUIPMENT TYPE	CONCENTRATE DAY BIN
210-116-0300	
EQUIPMENT TYPE	CONCENTRATE DAY BIN
210-116-0400	
EQUIPMENT TYPE	DAY BIN
210-117-0100	
EQUIPMENT TYPE	DRIED CHARGE BIN
210-117-0200	
EQUIPMENT TYPE	DRIED CHARGE BIN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

210-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
MOTOR NO./RATING (Kw)	*** 210-167-0100-M1*** 4 ***
MOTOR TITLE	BELT CONVEYOR

210-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
MOTOR NO./RATING (Kw)	*** 210-167-0200-M1*** 11 ***
MOTOR TITLE	BELT CONVEYOR

210-167-0300

EQUIPMENT TYPE	BELT CONVEYOR
MOTOR NO./RATING (Kw)	***210-167-0300-M1 *** 3.0 ***
MOTOR TITLE	BELT CONVEYOR

210-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR
MOTOR NO./RATING (Kw)	***210-168-0100-M1 *** 7.5 ***
MOTOR TITLE	DRAG CONVEYOR

210-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR
MOTOR NO./RATING (KW)	***210-168-0200-M1 *** 7.5 ***
MOTOR TITLE	DRAG CONVEYOR

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

CLIENT NO :
REVISION :5 DATE :22.08.85

210-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM
MOTOR NO./RATING (KW) MOTOR TITLE	***210-170-0100-M1 *** 132 *** AIR BLOWER ***210-170-0100-M2 *** 132 *** AIR BLOWER,STAND BY ***210-170-0100-M3 *** 1,1 *** AIR LOCK ***210-170-0100-M4 *** 1,1 AIR LOCK ***210-170-0100-M5 *** 5 *** RETURN AIR FAN

210-194-0100

EQUIPMENT TYPE	MULTICOIL DRYER
MOTOR NO./RATING (KW) MOTOR TITLE	*** 210-194-0100-M1*** 160 *** MULTICOIL DRYER

210-194-0200

EQUIPMENT TYPE	MULTICOIL DRYER
MOTOR NO./RATING (KW) MOTOR TITLE	***210-194-0200-M1 *** 160 *** MULTICOIL DRYER

210-212-0100

EQUIPMENT TYPE	EXHAUST AIR FAN
MOTOR NO./RATING (Kw) MOTOR TITLE	***210-212-0100-M1 *** 45 *** EXHAUST AIR FAN

210-218-0100

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
MOTOR NO./RATING (Kw) MOTOR TITLE	*** 210-218-0100-M1*** 7,5 *** BELT FEEDER

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

CLIENT NO :
REVISION :5 DATE :22.08.85

210-218-0200

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
MOTOR NO./RATING (Kw)	*** 210-218-0200-M1*** 7,5 ***
MOTOR TITLE	BELT FEEDER

210-218-0300

EQUIPMENT TYPE	BELT FEEDER FOR CONCENTRATE
MOTOR NO./RATING (KW)	*** 210-218-0300-M1*** 7,5 ***
MOTOR TITLE	BELT FEEDER

210-218-0400

EQUIPMENT TYPE	BELT FEEDER
MOTOR NO./RATING (Kw)	***210-218-0400-M1 *** 3,0 ***
MOTOR TITLE	BELT FEEDER

210-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
MOTOR NO./RATING (KW)	***210-411-0100-M1 *** 15 ***
MOTOR TITLE	VIBRATING SCREEN

210-417-0100

EQUIPMENT TYPE	BAG FILTER

220-----0

EQUIPMENT TYPE	FLASH SMELTING FURNACE AREA

220-106-0100

EQUIPMENT TYPE	GRANULATION BASIN

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

220-108-0200

EQUIPMENT TYPE GRANULATION BASIN

220-131-0100

EQUIPMENT TYPE COAL DUST BURNER

220-131-0200

EQUIPMENT TYPE COAL DUST BURNER

220-131-0300

EQUIPMENT TYPE COAL DUST BURNER

220-131-0400

EQUIPMENT TYPE COAL DUST BURNER

220-131-0500

EQUIPMENT TYPE COAL DUST BURNER

220-131-0600

EQUIPMENT TYPE COAL DUST BURNER

220-133-0100

EQUIPMENT TYPE AUXILIARY BURNER

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-133-0200

EQUIPMENT TYPE — AUXILIARY BURNER

220-140-0100

EQUIPMENT TYPE — SLAG LAUNDER WITH COVERS

220-140-0200

EQUIPMENT TYPE — SLAG LAUNDER WITH COVERS

220-140-0300

EQUIPMENT TYPE — SLAG LAUNDER WITH COVERS

220-140-0400

EQUIPMENT TYPE — SLAG LAUNDER WITH COVERS

220-140-0500

EQUIPMENT TYPE — GRANULATION LAUNDER

220-140-0600

EQUIPMENT TYPE — GRANULATION LAUNDER

220-167-0100

EQUIPMENT TYPE — BELT CONVEYOR

MOTOR NO./RATING (Kw) — ***220-167-0100-M1 ***11 ***
MOTOR TITLE — BELT CONVEYOR

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-174-0100

EQUIPMENT TYPE	RAKE CLASSIFIER
MOTOR NO./RATING (Kw)	***220-174-0100-M1 *** 11 ***
MOTOR TITLE	RAKE CLASSIFIER

220-174-0200

EQUIPMENT TYPE	RAKE CLASSIFIER
MOTOR NO./RATING (Kw)	***220-174-0200-M1 *** 11 ***
MOTOR TITLE	RAKE CLASSIFIER

220-198-0100

EQUIPMENT TYPE	GAS DUCTWORK

220-198-0200

EQUIPMENT TYPE	GAS DUCTWORK

220-212-0100

EQUIPMENT TYPE	PROCESS AIR FAN
MOTOR NO./RATING (KW)	*** 220-212-0100-M1*** 160 ***
MOTOR TITLE	PROCESS AIR FAN

220-212-0200

EQUIPMENT TYPE	PROCESS AIR FAN
MOTOR NO./RATING (Kw)	*** 220-212-0200-M1*** 160 ***
MOTOR TITLE	PROCESS AIR FAN

220-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
MOTOR NO./RATING (Kw)	***220-212-0300-M1*** 110 ***
MOTOR TITLE	COMBUSTION AIR FAN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-223-0100

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
MOTOR NO./RATING (Kw) MOTOR TITLE	***220-223-0100-M1 *** 11 *** DRAG FEEDER

220-223-0200

EQUIPMENT TYPE	DRIED CHARGE DRAG FEEDER
MOTOR NO./RATING (KW) MOTOR TITLE	***220-223-0200-M1 *** 11 *** DRAG FEEDER

220-261-0100

EQUIPMENT TYPE	FLASH SMELTING FURNACE

220-289-0100

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER

220-289-0200

EQUIPMENT TYPE	JACKET WATER HEAT EXCHANGER

220-289-0300

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER

220-289-0400

EQUIPMENT TYPE	SPRAY WATER HEAT EXCHANGER

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-318-0100

EQUIPMENT TYPE	OVERHEAD TRAVELLING CRANE
MOTOR NO./RATING (Kw) MOTOR TITLE	***220-318-0100-M1 *** 11 *** OVERHEAD TRAVELLING CRANE ***220-318-0100-M2 *** 2,2 *** OVERHEAD TRAVELLING CRANE ***220-318-0100-M3 *** 1,1 *** OVERHEAD TRAVELLING CRANE

220-376-0100

EQUIPMENT TYPE	JACKET WATER PUMP
MOTOR NO./RATING (Kw) MOTOR TITLE	***220-376-0100-M1 ***200 *** JACKET WATER PUMP

220-376-0200

EQUIPMENT TYPE	JACKET WATER PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***220-376-0200-M1 ***200 *** JACKET WATER PUMP

220-376-0400

EQUIPMENT TYPE	SPRAY WATER PUMP
MOTOR NO./RATING (Kw) MOTOR TITLE	***220-376-0400-M1 *** 90 *** SPRAY WATER PUMP

220-376-0500

EQUIPMENT TYPE	SPRAY WATER PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***220-376-0500-M1 *** 90 *** SPRAY WATER PUMP

220-376-0700

EQUIPMENT TYPE	GRANULATION WATER PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***220-376-0700-M1 *** 90 *** GRANULATION WATER PUMP

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

CLIENT NO :
REVISION :5 DATE :22.08.85

220-376-0800

EQUIPMENT TYPE	GRANULATION WATER PUMP
MOTOR NO./RATING (Kw)	***220-376-0800-M1 *** 90 ***
MOTOR TITLE	GRANULATION WATER PUMP

220-376-0900

EQUIPMENT TYPE	GRANULATION WATER PUMP
MOTOR NO./RATING (Kw)	***220-376-0900-M1 *** 90 ***
MOTOR TITLE	GRANULATION WATER PUMP

220-435-0100

EQUIPMENT TYPE	CONCENTRATE BURNER

220-519-0100

EQUIPMENT TYPE	JACKET WATER TANK

220-519-0200

EQUIPMENT TYPE	SPRAY WATER TANK

220-519-0300

EQUIPMENT TYPE	OIL TANK

220-519-0400

EQUIPMENT TYPE	OIL TANK

220-569-0100

EQUIPMENT TYPE	EMERGENCY DAMPER BETWEEN FSF-WHB

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

CLIENT NO :
REVISION :5 DATE :22.08.85

230-----0

EQUIPMENT TYPE	PROCESS GAS HANDLING AREA

230-124-0100

EQUIPMENT TYPE	WASTE HEAT BOILER

230-198-0100

EQUIPMENT TYPE	GAS DUCTWORK

230-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
MOTOR NO./RATING (KW)	***230-212-0100-M1 *** 250 ***
MOTOR TITLE	PROCESS GAS FAN

230-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
MOTOR NO./RATING (KW)	***230-220-0200-M1 *** 250 ***
MOTOR TITLE	PROCESS GAS FAN

230-372-0100

EQUIPMENT TYPE	EJECTOR

230-372-0200

EQUIPMENT TYPE	EJECTOR

230-372-0300

EQUIPMENT TYPE	EJECTOR

CLIENT :PPCL
DOCUMENT:MOTOR LIST (6)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

230-376-0100

EQUIPMENT TYPE	WATER PUMP
MOTOR NO./RATING (KW)	***230-376-0100-M1 *** 200 ***
MOTOR TITLE	WHB CIRCULATION WATER PUMP

230-376-0200

EQUIPMENT TYPE	WATER PUMP

230-421-0100

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
MOTOR NO./RATING (KW)	*** SEVERAL,TOTAL *** 90 ***
MOTOR TITLE	

230-421-0200

EQUIPMENT TYPE	ELECTROSTATIC PRECIPITATOR
MOTOR NO./RATING (KW)	*** SEVERAL,TOTAL *** 90 ***
MOTOR TITLE	

230-562-0100

EQUIPMENT TYPE	DISC VALVE

230-562-0200

EQUIPMENT TYPE	DISC VALVE

240-----0

EQUIPMENT TYPE	FLUE DUST HANDLING AREA

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

240-140-0100

EQUIPMENT TYPE	LAUNDER

240-168-0100

EQUIPMENT TYPE	DRAG CONVEYOR FOR WHB DUST
MOTOR NO./RATING (KW)	***240-168-0100-M1 *** 5,5 ***
MOTOR TITLE	DRAG CONVEYOR FOR WHB DUST

240-168-0200

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
MOTOR NO./RATING (KW)	***240-168-0200-M1 *** 3 ***
MOTOR TITLE	DRAG CONVEYOR FOR EP DUST

240-168-0300

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
MOTOR NO./RATING (KW)	***240-168-0300-M1 *** 3 ***
MOTOR TITLE	DRAG CONVEYOR FOR EP DUST

240-168-0400

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
MOTOR NO./RATING (KW)	***240-168-0400-M1 *** 3 ***
MOTOR TITLE	DRAG CONVEYOR FOR EP DUST

240-168-0500

EQUIPMENT TYPE	DRAG CONVEYOR FOR EP DUST
MOTOR NO./RATING (KW)	***240-168-0500-M1 *** 3 ***
MOTOR TITLE	DRAG CONVEYOR FOR EP DUST

240-209-0100

EQUIPMENT TYPE	WATER LOCK

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

240-209-0200

EQUIPMENT TYPE WATER LOCK

240-209-0300

EQUIPMENT TYPE WATER LOCK

240-209-0400

EQUIPMENT TYPE WATER LOCK

240-209-0500

EQUIPMENT TYPE WATER LOCK

240-374-0300

EQUIPMENT TYPE SLURRY PUMP

MOTOR NO./RATING (KW) ***240-374-0300-M1 *** 7.5 ***
MOTOR TITLE SLURRY PUMP

240-374-0400

EQUIPMENT TYPE SLURRY PUMP

MOTOR NO./RATING (Kw) ***240-374-0400-M1 *** 7.5 ***
MOTOR TITLE SLURRY PUMP

240-376-0100

EQUIPMENT TYPE WATER PUMP

MOTOR NO./RATING (Kw) ***240-376-0100-M1 *** 15 ***
MOTOR TITLE WATER PUMP

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

CLIENT NO :
REVISION :5 DATE :22.08.85

240-376-0200

EQUIPMENT TYPE	WATER PUMP
MOTOR NO./RATING (Kw) MOTOR TITLE	***240-376-0200-M1 *** 15 *** WATER PUMP

240-518-0100

EQUIPMENT TYPE	PUMP TANK

240-532-0100

EQUIPMENT TYPE	THICKENER
MOTOR NO./RATING (Kw) MOTOR TITLE	***240-532-0100-M1 *** 3 *** THICKENER ***240-532-0100-M2 *** 3 *** THICKENER ***240-532-0100-M3 *** 0,5 *** THICKENER

300-----0

EQUIPMENT TYPE	SULPHUR PLANT AREA

310-----0

EQUIPMENT TYPE	SULPHUR RECOVERING AREA

310-129-0100

EQUIPMENT TYPE	SULPHUR CONDENSING BOILER
MOTOR NO./RATING (Kw) MOTOR TITLE	*** 310-129-0100-M1*** 110 *** CIRCULATION WATER PUMP *** 310-129-0100-M2*** 90 *** CIRCULATION WATER PUMP

310-129-0200

EQUIPMENT TYPE	GAS COOLING BOILER
MOTOR NO./RATING (Kw)	***310-129-0200 *** 110 ***
MOTOR TITLE	CIRCULATION WATER PUMP

310-198-0100

EQUIPMENT TYPE	GAS DUCT

310-198-0200

EQUIPMENT TYPE	GAS DUCT

310-204-0100

EQUIPMENT TYPE	STACK

310-209-0100

EQUIPMENT TYPE	WATER LOCK

310-209-0200

EQUIPMENT TYPE	WATER LOCK

310-209-0300

EQUIPMENT TYPE	WATER LOCK

310-212-0100

EQUIPMENT TYPE	PROCESS GAS FAN
MOTOR NO./RATING (KW)	***310-212-0100-M1 *** 160 ***
MOTOR TITLE	PROCESS GAS FAN

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-212-0200

EQUIPMENT TYPE	PROCESS GAS FAN
MOTOR NO./RATING (Kw)	***310-212-0200-M1 *** 160 ***
MOTOR TITLE	PROCESS GAS FAN

310-212-0300

EQUIPMENT TYPE	COMBUSTION AIR FAN
MOTOR NO./RATING (Kw)	***310-212-0300-M1 *** 132 ***
MOTOR TITLE	COMBUSTION AIR FAN

310-212-0400

EQUIPMENT TYPE	COMBUSTION AIR FAN
MOTOR NO./RATING (Kw)	***310-212-0400-M1 *** 132 ***
MOTOR TITLE	COMBUSTION AIR FAN

310-212-0500

EQUIPMENT TYPE	FAN
MOTOR NO./RATING (Kw)	***310-212-0500-M1 *** 160 ***
MOTOR TITLE	EXHAUST GAS FAN

310-212-0600

EQUIPMENT TYPE	FAN
MOTOR NO./RATING (Kw)	***310-212-0600-M1 *** 160 ***
MOTOR TITLE	EXHAUST GAS FAN

310-212-0700

EQUIPMENT TYPE	COMBUSTION AIR FAN
MOTOR NO./RATING (KW)	***310-212-0700-M1 *** 75 ***
MOTOR TITLE	COMBUSTION AIR FAN

CLIENT :PPCL
DOCUMENT:MOTOR LIST (6)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :AKI

CLIENT NO :
REVISION :5 DATE :22.08.85

310-213-0800

EQUIPMENT TYPE — SECONDARY AIR FAN

MOTOR NO./RATING (KW) — ***310-213-0800-M1 *** 90 ***
MOTOR TITLE — SECONDARY AIR FAN

310-263-0100

EQUIPMENT TYPE — INCINERATOR

310-281-0100

EQUIPMENT TYPE — GAS REHEATER

310-370-0100

EQUIPMENT TYPE — FUEL OIL PUMP

MOTOR NO./RATING (KW) — ***310-370-0100-M1 *** 3 ***
MOTOR TITLE — FUEL OIL PUMP

310-370-0200

EQUIPMENT TYPE — FUEL OIL PUMP

MOTOR NO./RATING (KW) — ***310-370-0200-M1 *** 3 ***
MOTOR TITLE — FUEL OIL PUMP

310-370-0300

EQUIPMENT TYPE — FUEL OIL PUMP

MOTOR NO./RATING (KW) — ***310-370-0300-M1 *** 3 ***
MOTOR TITLE — FUEL OIL PUMP

310-374-0100

EQUIPMENT TYPE — SLURRY PUMP

MOTOR NO./RATING (KW) — ***310-374-0100-M1*** 90 ***
MOTOR TITLE — SLURRY PUMP

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-374-0200

EQUIPMENT TYPE	SLURRY PUMP
MOTOR NO./RATING (KW)	***310-374-0200-M1 *** 90 ***
MOTOR TITLE	SLURRY PUMP

310-374-0300

EQUIPMENT TYPE	SLURRY PUMP
MOTOR NO./RATING (KW)	***310-374-0300-M1 *** 90 ***
MOTOR TITLE	SLURRY PUMP

310-374-0400

EQUIPMENT TYPE	WATER PUMP
MOTOR NO./RATING (KW)	***310-370-0400-M1 *** 30 ***
MOTOR TITLE	WATER PUMP

310-374-0500

EQUIPMENT TYPE	WATER PUMP
MOTOR NO./RATING (KW)	***310-370-0500-M1 *** 30 ***
MOTOR TITLE	WATER PUMP

310-374-0600

EQUIPMENT TYPE	WATER PUMP
MOTOR NO./RATING (KW)	***310-370-0600-M1 *** 30 ***
MOTOR TITLE	WATER PUMP

310-374-0700

EQUIPMENT TYPE	WATER PUMP
MOTOR NO./RATING (KW)	***310-370-0700-M1 *** 30 ***
MOTOR TITLE	WATER PUMP

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

CLIENT NO :
REVISION :5 DATE :22.08.85

310-376-0100

EQUIPMENT TYPE WATER PUMP

MOTOR NO./RATING (Kw) ***310-376-0100-M1 *** 15 ***
MOTOR TITLE WATER PUMP

310-376-0200

EQUIPMENT TYPE WATER PUMP

MOTOR NO./RATING (Kw) ***310-376-0200-M1 *** 15 ***
MOTOR TITLE WATER PUMP

310-420-0100

EQUIPMENT TYPE DEMISTER

310-420-0200

EQUIPMENT TYPE DEMISTER

310-423-0100

EQUIPMENT TYPE SCRUBBER

310-423-0200

EQUIPMENT TYPE ABSORBTION TOWER

310-431-0100

EQUIPMENT TYPE AGGLOMERATOR

310-433-0100

EQUIPMENT TYPE HOT CATALYZER

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

310-433-0200

EQUIPMENT TYPE COLD CATALYZER

310-433-0300

EQUIPMENT TYPE COLD CATALYZER

310-464-0100

EQUIPMENT TYPE SULPHUR CONDENSING TOWER

310-464-0200

EQUIPMENT TYPE SULPHUR CONDENSING TOWER

310-516-0100

EQUIPMENT TYPE MIXING TANK

MOTOR NO./RATING (KW) ***310-516-0100-M1 *** 37 ***
MOTOR TITLE MIXING TANK

310-518-0100

EQUIPMENT TYPE PUMP TANK

320-----0

EQUIPMENT TYPE SULPHUR HANDLING AREA

320-117-0100

EQUIPMENT TYPE BIN

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-129-0100

EQUIPMENT TYPE	SULPHUR COOLING BOILER		

320-129-0200

EQUIPMENT TYPE	SULPHUR COOLING BOILER		

320-129-0300

EQUIPMENT TYPE	SULPHUR COOLING BOILER		

320-167-0100

EQUIPMENT TYPE	BELT CONVEYOR		
MOTOR NO./RATING (KW)	***320-167-0100-M1 ***	5,5	***
MOTOR TITLE	BELT CONVEYOR		

320-167-0200

EQUIPMENT TYPE	BELT CONVEYOR		
MOTOR NO./RATING (KW)	***320-167-0200-M1 ***	5,5	***
MOTOR TITLE	BELT CONVEYOR		

320-167-0300

EQUIPMENT TYPE	BELT CONVEYOR		
MOTOR NO./RATING (KW)	***320-167-0300-M1 ***	11	***
MOTOR TITLE	BELT CONVEYOR		

320-172-0100

EQUIPMENT TYPE	SCREW CONVEYOR		
MOTOR NO./RATING (KW)	***320-172-0100-M1 ***	0,75	***
MOTOR TITLE	SCREW CONVEYOR		

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-212-0100

EQUIPMENT TYPE	AIR COOLING FAN
MOTOR NO./RATING (KW)	***320-212-0100-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN

320-212-0200

EQUIPMENT TYPE	AIR COOLING FAN
MOTOR NO./RATING (KW)	*** 320-212-0200-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN

320-212-0300

EQUIPMENT TYPE	AIR COOLING FAN
MOTOR NO./RATING (KW)	*** 320-212-0300-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN

320-212-0400

EQUIPMENT TYPE	AIR COOLING FAN
MOTOR NO./RATING (KW)	*** 320-212-0400-M1*** 15 ***
MOTOR TITLE	AIR COOLING FAN

320-214-0100

EQUIPMENT TYPE	AIR BLOWER
MOTOR NO./RATING (KW)	***320-214-0100-M1 *** 11 ***
MOTOR TITLE	AIR BLOWER

320-244-0100

EQUIPMENT TYPE	GRAVITY FILTER

320-244-0200

EQUIPMENT TYPE	GRAVITY FILTER

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-0100

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (Kw)	***320-370-0100-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP

320-370-0200

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (Kw)	***320-370-0200-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP

320-370-0300

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-0300-M1 *** 18,5 ***
MOTOR TITLE	SULPHUR PUMP

320-370-0400

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (Kw)	***320-370-0400-M1 *** 18,5 ***
MOTOR TITLE	SULPHUR PUMP

320-370-0500

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (Kw)	***320-370-0500-M1 *** 3 ***
MOTOR TITLE	SULPHUR PUMP

320-370-0600

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (Kw)	***320-370-0600-M1 *** 3 ***
MOTOR TITLE	SULPHUR PUMP

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-370-0700

EQUIPMENT TYPE	PUMP		
MOTOR NO./RATING (KW)	***320-370-0700-M1 ***	15	***
MOTOR TITLE	SULPHUR PUMP		

320-370-0800

EQUIPMENT TYPE	PUMP		
MOTOR NO./RATING (KW)	***320-370-0800-M1 ***	15	***
MOTOR TITLE	SULPHUR PUMP		

320-370-0900

EQUIPMENT TYPE	PUMP		
MOTOR NO./RATING (Kw)	***320-370-0900-M1 ***	11	***
MOTOR TITLE	SULPHUR PUMP		

320-370-1000

EQUIPMENT TYPE	PUMP		
MOTOR NO./RATING (KW)	***320-370-1000-M1 ***	11	***
MOTOR TITLE	SULPHUR PUMP		

320-370-1100

EQUIPMENT TYPE	PUMP		
MOTOR NO./RATING (Kw)	***320-370-1100-M1 ***	15	***
MOTOR TITLE	SULPHUR PUMP		

320-370-1200

EQUIPMENT TYPE	PUMP		
MOTOR NO./RATING (Kw)	***320-370-1200-M1 ***	15	***
MOTOR TITLE	SULPHUR PUMP		

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-1300

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-1300-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP

320-370-1400

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-1400-M1 *** 11 ***
MOTOR TITLE	SULPHUR PUMP

320-370-1500

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-1500-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP

320-370-1600

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-1600-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP

320-370-1700

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-1700-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP

320-370-1800

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***320-370-1800-M1 *** 90 ***
MOTOR TITLE	SULPHUR CIRCULATING PUMP

CLIENT :PPCL
DOCUMENT:MOTOR LIST (6)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :AKI

CLIENT NO :
REVISION :5 DATE :22.08.85

320-370-1900

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***320-370-1900-M1 *** 90 *** SULPHUR CIRCULATING PUMP

320-370-2000

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***320-370-2000-M1 *** 90 *** SULPHUR CIRCULATING PUMP

320-370-2300

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***320-370-2300-M1 *** 37 *** SULPHUR PRILLING PUMP

320-370-2400

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***320-370-2400-M1 *** 37 *** SULPHUR PRILLING PUMP

320-371-0100

EQUIPMENT TYPE	DOSAGE PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***320-371-0100-M1 *** 1,5 *** DOSAGE PUMP

320-371-0200

EQUIPMENT TYPE	DOSAGE PUMP
MOTOR NO./RATING (KW) MOTOR TITLE	***320-371-0200-M1 *** 1,5 *** DOSAGE PUMP

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

320-371-0300

EQUIPMENT TYPE	DOSAGE PUMP			
MOTOR NO./RATING (Kw)	***320-371-0300-M1 ***	1,5	***	
MOTOR TITLE	DOSAGE PUMP			

320-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN			
MOTOR NO./RATING (Kw)	***320-411-0100-M1 ***	15	***	
MOTOR TITLE	VIBRATING SCREEN			

320-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN			
MOTOR NO./RATING (Kw)	***320-411-0200-M1 ***	15	***	
MOTOR TITLE	VIBRATING SCREEN			

320-509-0100

EQUIPMENT TYPE	PRILLING TOWER			

320-511-0100

EQUIPMENT TYPE	AUTOCLAVE			
MOTOR NO./RATING (KW)	***320-511-0100-M1 ***	3	***	
MOTOR TITLE	AUTOCLAVE			
	***320-511-0100-M2 ***	3	***	
	AUTOCLAVE			

320-511-0200

EQUIPMENT TYPE	AUTOCLAVE			
MOTOR NO./RATING (KW)	***320-511-0100-M1 ***	3	***	
MOTOR TITLE	AUTOCLAVE			
	***320-511-0100-M2 ***	3	***	
	AUTOCLAVE			

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-515-0100

EQUIPMENT TYPE	MEASURING TANK

320-516-0100

EQUIPMENT TYPE	MIXING TANK
MOTOR NO./RATING (KW)	***320-516-0100-M1 *** 4 ***
MOTOR TITLE	MIXING TANK

320-518-0100

EQUIPMENT TYPE	PUMP TANK

320-518-0200

EQUIPMENT TYPE	PUMP TANK

320-518-0300

EQUIPMENT TYPE	PUMP TANK

320-518-0400

EQUIPMENT TYPE	PUMP TANK

320-518-0500

EQUIPMENT TYPE	PUMP TANK

320-518-0600

EQUIPMENT TYPE	PUMP TANK

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

CLIENT NO :
REVISION :5 DATE :22.08.85

320-516-0700

EQUIPMENT TYPE	PUMP TANK

320-519-0100

EQUIPMENT TYPE	TANK

320-519-0200

EQUIPMENT TYPE	DAY TANK

330-----0

EQUIPMENT TYPE	WASTE LIQUID HANDLING AREA

330-212-0100

EQUIPMENT TYPE	FAN
MOTOR NO./RATING (KW)	***330-212-0100-M1 *** 5,5 ***
MOTOR TITLE	EXHAUST GAS FAN

330-243-0100

EQUIPMENT TYPE	DRUM FILTER
MOTOR NO./RATING (KW)	***330-243-0100-M1 *** 1,1 ***
MOTOR TITLE	DRUM FILTER
	***330-243-0100-M2 *** 0.75 ***
	DRUM FILTER

330-370-0100

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***330-370-0100-M1 *** 2,2 ***
MOTOR TITLE	UNDERFLOW PUMP

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

CLIENT NO :
REVISION :5 DATE :22.08.85

330-370-0200

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***330-370-0200-M1 *** 2,2 ***
MOTOR TITLE	UNDERFLOW PUMP

330-370-0300

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***330-370-0300-M1 *** 2,2 ***
MOTOR TITLE	OVERFLOW PUMP

330-370-0400

EQUIPMENT TYPE	PUMP
MOTOR NO./RATING (KW)	***330-370-0400-M1 *** 2,2 ***
MOTOR TITLE	OVERFLOW PUMP

330-375-0100

EQUIPMENT TYPE	VACUUM PUMP
MOTOR NO./RATING (KW)	***330-375-0100-M1 *** 11 ***
MOTOR TITLE	VACUUM PUMP

330-510-0100

EQUIPMENT TYPE	TANK

330-510-0200

EQUIPMENT TYPE	TANK

330-518-0100

EQUIPMENT TYPE	PUMP TANK

CLIENT :PPCL
DOCUMENT:MOTOR LIST (8)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :AKI

CLIENT NO :
REVISION :5 DATE :22.08.85

330-518-0200

EQUIPMENT TYPE — PUMP TANK

330-521-0100

EQUIPMENT TYPE — REACTOR TANK

330-532-0100

EQUIPMENT TYPE — THICKENER

MOTOR NO./RATING (KW)	MOTOR TITLE
***330-532-0100-M1 ***	2 *** THICKENER
***330-532-0100-M2 ***	0,75 *** THICKENER

500-----0

EQUIPMENT TYPE — COAL PLANT AREA

500-118-0100

EQUIPMENT TYPE — STORAGE BIN

500-118-0200

EQUIPMENT TYPE — STORAGE BIN

500-118-0300

EQUIPMENT TYPE — STORAGE BIN

500-118-0400

EQUIPMENT TYPE — STORAGE BIN

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

CLIENT NO :
REVISION :5 DATE :22.08.85

500-133-0100

EQUIPMENT TYPE	OIL BURNER

500-167-0100

EQUIPMENT TYPE	BELT CONVEYOR
MOTOR NO./RATING (Kw)	***500-167-0100-M1 *** 45 ***
MOTOR TITLE	BELT CONVEYOR

500-167-0200

EQUIPMENT TYPE	BELT CONVEYOR
MOTOR NO./RATING (Kw)	***500-167-0200-M1 *** 7.5 ***
MOTOR TITLE	BELT CONVEYOR

500-170-0100

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM

500-170-0200

EQUIPMENT TYPE	PNEUMATIC CONVEYOR SYSTEM

500-179-0100

EQUIPMENT TYPE	COAL INJECTION SYSTEM

500-202-0100

EQUIPMENT TYPE	FEED HOPPER

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

CLIENT NO :
REVISION :5 DATE :22.08.85

500-212-0100

EQUIPMENT TYPE	FAN
MOTOR NO./RATING (Kw)	*** 500-212-0100-M1*** 30 ***
MOTOR TITLE	FAN

500-212-0200

EQUIPMENT TYPE	FAN
MOTOR NO./RATING (Kw)	*** 500-212-0200-M1*** 250 ***
MOTOR TITLE	FAN

500-212-0300

EQUIPMENT TYPE	EXHAUST AIR FAN
MOTOR NO./RATING (Kw)	***500-212-030-M1 ***- 22 ***
MOTOR TITLE	FAN

500-212-0400

EQUIPMENT TYPE	FAN
MOTOR NO./RATING (Kw)	***500-212-0400-M1 *** 11 ***

500-216-0100

EQUIPMENT TYPE	AIR LOCK FEEDER
MOTOR NO./RATING (Kw)	***500-216-0100-M1 *** 2,2 ***
MOTOR TITLE	AIR LOCK FEEDER

500-216-0200

EQUIPMENT TYPE	AIR LOCK FEEDER
MOTOR NO./RATING (Kw)	***500-216-0200-M1 *** 2,2 ***
MOTOR TITLE	AIR LOCK FEEDER

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-218-0100

EQUIPMENT TYPE	BELT FEEDER
MOTOR NO./RATING (Kw)	***500-218-0100-M1 *** 7.5 ***
MOTOR TITLE	BELT FEEDER

500-223-0100

EQUIPMENT TYPE	DRAG FEEDER
MOTOR NO./RATING (Kw)	***500-223-0100-M1 *** 7,5 ***
MOTOR TITLE	DRAG FEEDER

500-223-0200

EQUIPMENT TYPE	DRAG FEEDER
MOTOR NO./RATING (Kw)	***500-223-0200-M1 *** 7,5 ***
MOTOR TITLE	DRAG FEEDER

500-281-0100

EQUIPMENT TYPE	PREHEATER

500-325-0100

EQUIPMENT TYPE	MILL
MOTOR NO./RATING (Kw)	***500-325-0100-M1 *** 315 ***
MOTOR TITLE	MILL

500-325-0200

EQUIPMENT TYPE	MILL
MOTOR NO./RATING (Kw)	***500-325-0200-M1 *** 315 ***
MOTOR TITLE	MILL

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

500-411-0100

EQUIPMENT TYPE	VIBRATING SCREEN
MOTOR NO./RATING (Kw)	***500-411-0100-M1 *** 2,2 ***
MOTOR TITLE	VIBRATING SCREEN

500-411-0200

EQUIPMENT TYPE	VIBRATING SCREEN
MOTOR NO./RATING (Kw)	***500-411-0200-M1 *** 2,2 ***
MOTOR TITLE	VIBRATING SCREEN

500-417-0100

EQUIPMENT TYPE	BAG FILTER

500-419-0100

EQUIPMENT TYPE	CYCLONE

600-----0

EQUIPMENT TYPE	POWER PLANT AREA

600-122-0100

EQUIPMENT TYPE	AUXILIARY BOILER

600-123-0100

EQUIPMENT TYPE	SUPERHEATING BOILER

600-276-0100

EQUIPMENT TYPE	CONDENSER

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1 CLIENT NO :
DESIGN :AKI REVISION :5 DATE :22.08.85

600-280-0100

EQUIPMENT TYPE	HEAT EXCHANGER

600-280-0200

EQUIPMENT TYPE	HEAT EXCHANGER

600-376-0100

EQUIPMENT TYPE	CONDENSATE PUMP
MOTOR NO./RATING (KW)	***600-376-0100-M1 *** 22 ***
MOTOR TITLE	CONDENSATE PUMP

600-376-0200

EQUIPMENT TYPE	CONDENSATE PUMP
MOTOR NO./RATING (KW)	***600-376-0200-M1 *** 22 ***
MOTOR TITLE	CONDENSATE PUMP

600-376-0300

EQUIPMENT TYPE	CONDENSATE PUMP
MOTOR NO./RATING (KW)	***600-376-0300-M1 *** 400 ***
MOTOR TITLE	CONDENSATE PUMP

600-376-0400

EQUIPMENT TYPE	CONDENSATE PUMP

600-376-0500

EQUIPMENT TYPE	CONDENSATE PUMP
MOTOR NO./RATING (KW)	***600-376-[illegible] M1 *** 30 ***
MOTOR TITLE	FEED WATER P[illegible]

CLIENT :PPCL
DOCUMENT:MOTOR LIST (B)
OUTOKUMPU NO :360 100 900 001 ALT1
DESIGN :AKI
CLIENT NO :
REVISION :5 DATE :22.08.85

600-376-0600

EQUIPMENT TYPE — CONDENSATE PUMP

600-376-0700

EQUIPMENT TYPE — CONDENSATE PUMP

MOTOR NO./RATING (KW) — ***600-376-0700-M1 *** 15 ***
MOTOR TITLE — FEED WATER PUMP

600-514-0100

EQUIPMENT TYPE — FEED TANK

600-556-0100

EQUIPMENT TYPE — TURBOALTERNATOR

700-----0

EQUIPMENT TYPE — OXYGEN PLANT AREA

800-----0

EQUIPMENT TYPE — LIME STONE SLURRY PREPARATION

900-----0

EQUIPMENT TYPE — WATER TREATMENT AREA

950-----0

EQUIPMENT TYPE — COMPRESSED AIR STATION