

収され原料塩溶解槽に戻され、マッドは廃棄される。

2) 電 解 工 程

イオン交換膜式電解槽には塩水が供給され、陽極で塩素ガスが発生し、陰極では苛性ソーダと水素ガスを発生する。この際、陰極には軟水を供給する必要がある。

塩素ガス分離後の塩水は塩水精製工程に戻される。塩素ガスは洗滌、冷却後一部はナトリウムハイポ製造工程に送り、残りは硫酸を使用した乾燥塔を通して乾燥させる。乾燥塩素ガスは必要量がパルプ漂白工程へ送られ、余剰分は液化される。

一方水素ガスは大気に放出される。

苛性ソーダは必要濃度に調整後、パルプ漂白工程へ供給される。

3) ナトリウムハイポ製造工程

苛性ソーダ液はベントガススクラバを通して冷却器付きのナトリウムハイポタワに送られ、そこで塩素ガスと反応し必要濃度のナトリウムハイポとなる。

ナトリウムハイポ液はナトリウムハイポ貯蔵タンクに送られ、そこから漂白工程に供給される。

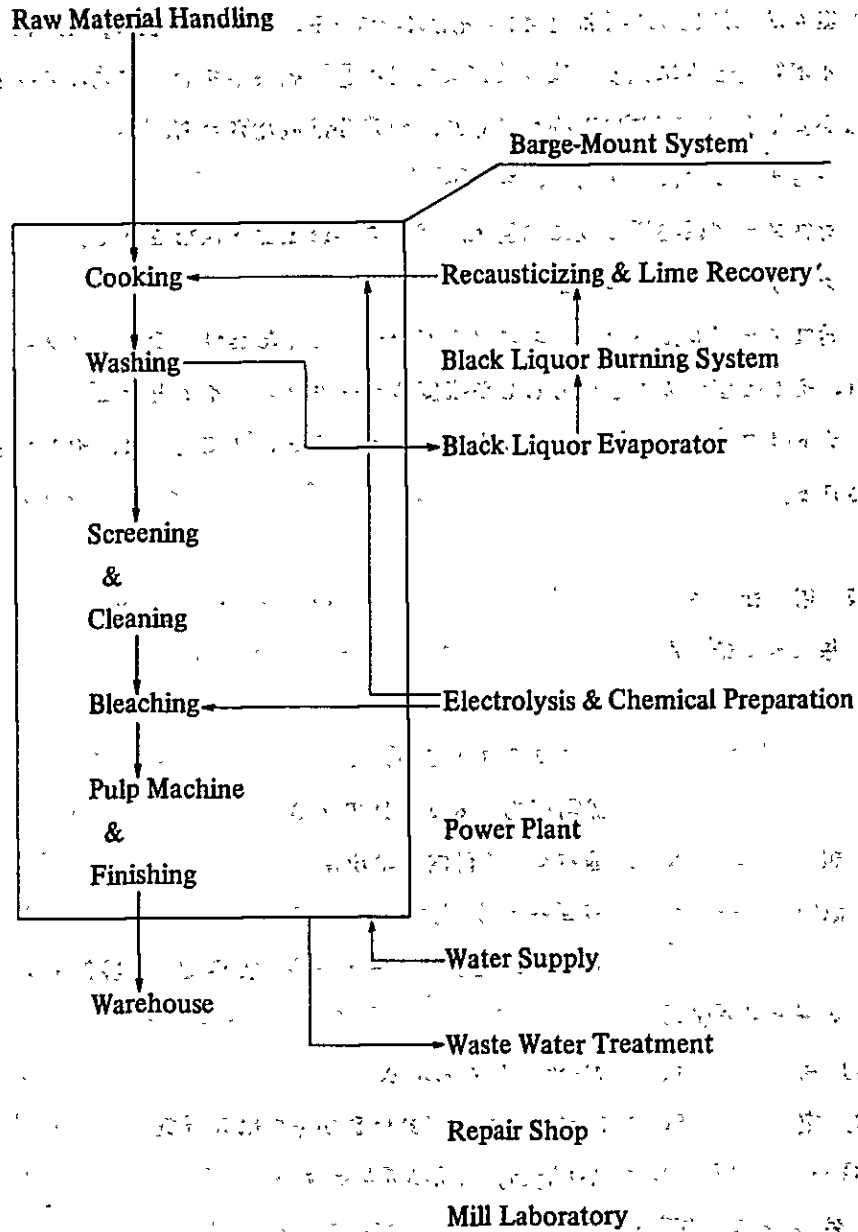
7.5 技 術 仕 様

7.5.1 基 本 条 件

1. プラント能力 : 7.5 A D T / D
25,000 A T D / Y
設計能力 80 B D T / D
2. 製 品 : 晒パルプ (国内・輸出用)
3. 原 料 : ジュートカッピングス
将来この他のジュート原料も使用できる設備・レイアウトとする。
4. ユーティリティ
 - 1) 用 水 : Meghna 川から取水
 - 2) 電 気 : 自家発電および P O B からの購入電気
 - 3) 燃 料 : Ashuganj 地域の天然ガス
5. 薬 品
 - 1) 塩 素 : 自家製造
 - 2) 苛性ソーダ : 同 上
 - 3) 石 灰 石 : 購入品

7.5.2 プラントデザイン

1. フローチャート



2. プロセスの歩留・損失

Yield and Losses Table on Normal Operating Rate

<u>Description</u>	<u>Loss</u> (%)	<u>Accepted</u> (BDT/D)
1) Jute Cutting Received		133.3 (147.8 ADT/D)
2) Storage & Handling Loss	1.0	1.3
3) Jute Cutting Charged to Cooking		132.0
4) Cooking Yield	43.0	56.8
5) Pulp in Blow Tank		75.2
6) Liquid Cyclone Reject	0.4	0.3
7) Pulp Charged to Washing		74.9
8) Washing Loss	0.05	
9) Pulp Charged to Screening		74.9
10) Screening & Cleaning Reject	2.0	1.5
11) Pulp Charged to Bleaching		73.4
12) Bleach Shrinkage	8.0	5.8
13) Pulp Charged to Pulp Machine		67.6
14) Broke & White Water Losses	0.2	0.1
15) Production of Pulp		67.5 (75 ADT/D)

Hence overall yield on Jute Cuttings = $67.5 / 133.3 = 50.6\%$

3. 蒸解藥品回收

1) Active Alkali in Cooking:	21,120 kg/D as NaOH (16% on BD Jute Cuttings)
2) Alkali Loss in Process	
In Pulp Leaving Washer:	844 kg/D as NaOH (4% on Alkali charged into Cooking)
In Black Liquor Leaks:	211 kg/D as NaOH (1% on Alkali charged into Cooking)
In Black Liquor Burning:	422 kg/D as NaOH (2% on Alkali charged into Cooking)
In Reausticizing:	633 kg/D as NaOH (3% on Alkali charged into Cooking)
<hr/>	
Total	2,110 kg/D as NaOH (10% on Alkali charged into Cooking)

3) Make-up Chemical	
Make-up Chemical:	2,110 kg/D as NaOH

4) Composition of White Liquor from Reausticizing Plant

As process is soda process, active alkali = NaOH and activity = causticity.

Assume active alkali A.A = 120 kg/m³ as NaOH.

Assume actual value is 80% causticity NaOH/(NaOH + Na₂CO₃).

Since NaOH = 120 kg/m³,

Hence NaOH + Na₂CO₃ = 120 x 1/0.8 = 150 kg/m³.

Hence Na₂CO₃ = 150 - 120 = 30 kg/m³ as NaOH.

	<u>As NaOH</u>	<u>As weight chemical</u>
NaOH	120 kg/m ³	120 kg/m ³
Na ₂ CO ₃	30 kg/m ³	79 kg/m ³
Total Chemical	150 kg/m ³	199 kg/m ³

4. ユーティリティ消費量

1) Steam Consumption in Process

	LP (2.5 kg/cm ² G)	MP (10 kg/cm ² G)
Cooking	-	11,200 kg/hr
Bleaching	1,300 kg/hr	-
Pulp Machine	-	4,500 kg/hr
Black Liquor Evaporator	-	300 kg/hr
Misc.	700 kg/hr	-
Total	2,000 kg/hr	16,000 kg/hr

2) Electric Power Requirement

Main Pulping Process	1,600 kW
Chemical Recovery	600 kW
Power Plant	400 kW
Electrolysis & Chemical Preparation	1,700 kW
Water Supply & Effluent Treatment	500 kW
Others	200 kW
Total	5,000 kW

3) Fuel Gas Consumption

Power Boiler:	3,150 Nm ³ /hr
Black Liquor Burning:	120 Nm ³ /hr
Lime Kiln:	450 Nm ³ /hr
Total	3,720 Nm³/hr
Calorific Value	8,700 kcal/Nm³

DEPARTMENT 26. RAW MATERIAL HANDLING

26000

Design Base

(1) Capacity

Unloading and storing: 30 BDT/Hr by two unloader
Feeding to cooking: 10 BDT/Hr two-line

(2) Jute Cutting Bale

Pucca Bale: 1,300mm x 550mm x 500mm
200 kg
Kutchra Bale: 1,300mm x 700mm x 400mm
150 kg
Moisture: 10-15%

(3) Operation Time

Unloading & storing: 16 hours per day
Feeding to cooking: 24 hours per day

(4) Storing capacity:

4,000 DBT

- 26101 **Stationary Crane**
- Quantity: Two (2)
- Service: Unloading from ship
- Crane Capacity: 1,000 kg at 10,000 mm horizontal distance
- 26102 **Hand Car**
- Quantity: Twelve (12)
- Service: Transportation of Bale
- Type: Table type
- Loading Capacity: 2 tons
- 26103 **Mobile Crane**
- Quantity: Two (2)
- Service: Bale handling on storage pile
- Crane Capacity: 1,000 kg at 5,000 mm height
- Travelling Speed: 6 km/Hr
- 26104 **Loading Conveyor**
- Quantity: Two (2)
- Service: Transportation of Jute chips to Cooking
- Type: Flat belt
- Size: 2,000 mm Belt width x 20,000 mmL
- Speed: 20 m/min.
- Drive: 3.7 kW x 6P
- 26105 **Inclined Conveyor**
- Quantity: Two (2)
- Service: Transportation of Jute chips to Cooking
- Type: Flat belt and side wall type
- Size: 2,000 mm Belt width x 110,000 mm
- Inclined angle: 20°
- Speed: 20 m/min.
- Drive: 22 kW x 6P
- 26106 **Cutter Feeding Conveyor**
- Quantity: Four (4)
- Type: Flat belt and side wall type
- Size: 1,000 mm Belt width x 10,000 mm

26107 Cutter

Quantity: Four (4)

Type: Rotary type

Size: 1,000 mm width

26108 Dust Filter

Quantity: Four (4)

Type: Drum type

26109 Dust Collecting System

Quantity: Four (4) sets

Consist of Fans, Ducts, Cyclones and Tank.

DEPARTMENT 31. COOKING

31000

Design Basis

- 1) Capacity: 80 BDT/D as Unbleached Pulp
- 2) Digester: 6-Batch Digester (80 m³ each)
- 3) Density of Jute Cutting: 100 kg BD/m³ in Digester
- 4) Additive Chemicals: Active Alkali (NaOH), 16% on BD Jute Cutting
- 5) Cooking Condition
 - Pressure: 9.0 kg/cm² G
 - Temperature: 170°C
 - Liquor Ratio: 6.5
- 6) Cooking Cycle
 - Charging of Jute Cutting and Liquor: 150 mm
 - Raising of Cooking Temp.: 120 min.
 - Cooking at the Temp.: 120 min.
 - Blow-down of the Contents: 90 min.
- 7) Cooking Yield: 50%
- 8) White Liquor: 100 g/l as NaOH

31101	Digester	<p>Quantity: Six (6) Type: Rotary Globe Digester Volume: 80 m³ Main dimension: 5,450 mm Inner Dia. Material: Body-SM41A Drive: Beier Cyclo Reducer, Spur gear drive 37 kW x 8P motor Remarks: Insulated</p>
31102	Hoist	<p>Quantity: One (1) set Service: Digester Cover handling Type: Electric hoist and Gear trolley Capacity: 2 Tons</p>
31103	Heat Exchanger	<p>Quantity: One (1) Type: Shell & Tube Material: Stainless Tell (SUS 304) Mill Steel</p>
31201	Blow Pit Pump	<p>Quantity: Six (6) Service: Blow Pit Discharge Type: Sun-Cutter Capacity: 3 m³/min. x 12 m Head Material: Impeller; Stainless steel castings (SCS 13) Casing; Cast iron Drive: 37 kW x 4P</p>
31202	Blow Pit Pump	<p>Quantity: Six (6) Service: Blow Pit Discharge Type: Hydrostal Capacity: 8.0 m³/min. x 15 m Head Material: Impeller; Stainless steel casting (SCS 13) Casing; Cast iron Drive: 37 kW x 4P V-belt drive</p>

31203	Blow Tank Pump		
	Quantity:	One (1)	
	Service:	Blow Tank discharge	
	Type:	Centrifugal	
	Capacity:	2.5 m ³ /min. x 35 m Head	
	Material:		
	Impeller;	Stainless steel castings (SCS-13)	
	Casing;	Cast iron	
	Drive:	30 kW x 4P	
31204	White Liquor Pump		
	Quantity:	One (1)	
	Service:	White Liquor Tank discharge	
	Type:	Centrifugal	
	Capacity:	1.0 m ³ /min. x 15 m Head	
	Material:		
	Impeller;	Stainless steel castings (SCS-13)	
	Casing;	Cast iron	
	Drive:	5.5 kW x 4P	
31205	Black Liquor Pump		
	Quantity:	One (1)	
	Service:	Black Liquor Tank discharge to Blow Pit	
	Type:	Centrifugal	
	Capacity:	5.0 m ³ /min. x 15 m Head	
	Material:		
	Impeller;	Cast iron	
	Casing;	Cast iron	
	Drive:	18.5 kW x 4P	
31206	Black Liquor Pump		
	Quantity:	One (1)	
	Service:	Blow Liquor Tank discharge to Cooking Liquor Tank	
	Type:	Centrifugal	
	Capacity:	2.0 m ³ /min. x 15 m Head	
	Material:		
	Impeller;	Cast iron	
	Casing;	Cast iron	
	Drive:	11 kW x 4P	

31207

Black Liquor Pump

Quantity: One (1)
Service: Black Liquor Tank discharge to Dilute Stock
Type: Centrifugal
Capacity: 0.5 m³/min. x 10 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 3.7 kW x 4P

31208

Cooking Liquor Pump

Quantity: Two (2)
Service: Cooking Liquor Tank discharge
Type: Centrifugal
Capacity: 1.0 m³/min. x 18 m Head
Material:
Impeller; Stainless steel castings (SCS 13)
Casing; Cast iron
Drive: 5.5 kW x 4P

31301

Blow Pit Agitator

Quantity: Six (6)
Type: Horizontal, Mixing
Size: 1,200 mm ϕ
Material: Mild steel
Drive: 37 kW x 4P geared motor

31302

Blow Tank Agitator

Quantity: One (1)
Type: Horizontal, Propeller type
Size: 1,530 mm ϕ
Material: Cast iron & Stainless steel castings (SCS 13)
Drive: 75 kW x 8P motor, V-belt drive

31303

Cooking Liquor Tank Agitator

Quantity: One (1)
Type: Vertical
Size: 610 mm ϕ
Material: Mild steel & Stainless steel castings (SCS 13)
Drive: 7.5 kW x 4P

31401	Blow Pit	
	Quantity:	Six (6)
	Volume:	160 m³
	Material:	Mild steel
31402	Blow Tank	
	Quantity:	One (1)
	Volume:	220 m³
	Material:	Mild steel
31403	White Liquor Tank	
	Quantity:	One (1)
	Volume:	120 m³
	Material:	Mild steel
31404	Black Liquor Tank	
	Quantity:	One (1)
	Volume:	200 m³
	Material:	Mild steel
31405	Cooking Liquor Tank	
	Quantity:	One (1)
	Volume:	65 m³
	Material:	Mild steel
31601	Scaffolding	
	Quantity:	One (1) set
	Service:	For Digester and Blow Pit
	Material:	Mild steel
31701	Piping, Valves and Fittings	

One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 32. WASHING

32000

Design Basis

1) Capacity:

80 BDT/D

2) Washing:

3-Stage Counter Flow Washing

3) Dilution Factor:

3.5

4) Washer Load:

3 BDT/D-m²

32101 Liquid Cyclone

Quantity: One (1)
Type: No. 11
Capacity: 80 BDT/24 Hrs.
Pulp Consistency: 2.5%

32102 3-Stage Brown Stock Washer

Quantity: One (1) set
Type: Vacuum Drum Washer
Capacity: 80 BDT/24 Hrs.
Drum Size: 2,750 mm ϕ x 3,200 mm Face
Material: Mild steel
Wire cloth – SUS 316

Drive:
3 - Drum; Beier Cyclo Reducer
7.5 kW x 4P motor
2 - Repulper; Geared motor 11 kW x 4P
1 - Discharge Conveyor; Geared motor 3.7 kW x 4P

32103 Foam Breaker

Quantity: One (1)
Type: Vertical type
Size: 450 mm ϕ
Material:
Rotor; Stainless steel (SUS 304)
Body; Mild steel
Drive: 7.5 kW x 6P motor, V-belt drive

32104 Black Liquor Filter

Quantity: One (1)
Type: Rotary Drum Filter
Capacity: 800 m³/24 Hrs.
Drum Size: 1,000 mm ϕ x 1,600 mm Face
Material: Mild steel
Wire cloth – SUS 316
Drive: Cyclo Reducer
2.2 kW x 4P motor

32105: Washer Blow-Off Fan

Quantity: One (1)
Type: Turbo-fan
Capacity: 60 Nm³/min. x 400 m Aq.
Material: Mild steel
Drive: 11 kW x 4P motor, V-belt drive

32106 Hoist

Quantity: One (1) set
Service: Brown Stock Washer and Bleach Washer Maintenance
Type: Electric hoist and Gear trolley
Capacity: 10 Tons

32201 Washed Stock Pump

Quantity: One (1)
Service: Washed Stock Chest discharge
Type: Centrifugal
Capacity: 2.5 m³/min. x 10 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 11 kW x 4P

32202 Black Liquor Pump

Quantity: Three (3)
Service: Washer Filtrate Tank discharge to Wire Shower
Type: Centrifugal
Capacity: 0.9 m³/min. x 30 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 11 kW x 4P

32203 Black Liquor Pump

Quantity: Three (3)
Service: Washer Filtrate Tank discharge to dilute stock
Type: Centrifugal
Capacity: 5.5 m³/min. x 20 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 30 kW x 4P

32204 Black Liquor Pump

Quantity: Two (2)
Service: Washer Filtrate Tank discharge to Stock Shower
Type: Centrifugal
Capacity: 0.55 m³/min. x 23 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 5.5 kW x 4P

32205 Black Liquor Pump

Quantity: One (1)
Service: Washer Filtrate Tank discharge to Cooking Dept.
Type: Centrifugal
Capacity: 2.0 m³/min. x 15 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 11 kW x 4P

32206 Black Liquor Pump

Quantity: One (1)
Service: Foam Tank discharge
Type: Centrifugal
Capacity: 0.6 m³/min. x 20 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 5.5 kW x 4P

- 32207 **Black Liquor Pump** 60217
- Quantity:** One (1)
- Service:** Black Liquor Filtrate Tank discharge to Evaporation Dept.
- Type:** Centrifugal
- Capacity:** 0.6 m³/min. x 30 m Head
- Material:**
- Impeller;** Cast iron
- Casing;** Cast iron
- Drive:** 5.5 kW x 4P
-
- 32208 **Hot Water Pump** 60217
- Quantity:** One (1)
- Service:** Hot Water Tank discharge to Washer Shower
- Type:** Centrifugal
- Capacity:** 0.55 m³/min. x 23 m Head
- Material:**
- Impeller;** Cast iron
- Casing;** Cast iron
- Drive:** 5.5 kW x 4P
-
- 32209 **Hot Water Pump** 60217
- Quantity:** One (1)
- Service:** Hot Water Tank discharge to Bleach Washer Shower and to dilute bleached stock
- Type:** Centrifugal
- Capacity:** 3.8 m³/min. x 30 m Head
- Material:** Cast iron
- Drive:** 37 kW x 4P
-
- 32301 **Washed Stock Chest Agitator** 60217
- Quantity:** One (1)
- Type:** Horizontal, Propeller type
- Size:** 1,220 mm ϕ
- Material:** Cast iron & Stainless steel castings (SCS 13)
- Drive:** 30 kW x 6P motor, V-belt drive

32401	No. 1 Washer Filtrate Tank		
	Quantity:	One (1)	
	Volume:	50 m ³	
	Material:	Mild steel	
	Remarks:	Insulated	
32402	No. 2 Washer Filtrate Tank		
	Quantity:	One (1)	
	Volume:	50 m ³	
	Material:	Mild steel	
	Remarks:	Insulated	
32403	No. 3 Washer Filtrate Tank		
	Quantity:	One (1)	
	Volume:	50 m ³	
	Material:	Mild steel	
	Remarks:	Insulated	
32404	Foam Tank		
	Quantity:	One (1)	
	Volume:	45 m ³	
	Remarks:	Insulated	
32405	Washed Stock Chest		
	Quantity:	One (1)	
	Volume:	60 m ³	
	Material:	Mild steel	
32406	Black Liquor Filtrate Tank		
	Quantity:	One (1)	
	Volume:	15 m ³	
	Material:	Mild steel	
32407	Hot Water Tank		
	Quantity:	One (1)	
	Volume:	70 m ³	
	Main Dimension:	4,000 mm ϕ x 6,000 mm Height	
	Material:	Mild steel	
	Remarks:	Insulated	

32601 Scaffolding 10422

Quantity: One (1) set

Service: For Brown Stock Washer and
Foam Breaker

Material: Mild steel

32701 Piping, Valves and Fittings 10423

One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 33. SCREENING & CLEANING

33000

Design Basis:

1) **Capacity:** 80 BDT/D

2) **Screening:** 2-Stage Cowan Screens

3) **Cleaning:** 3-Stage Centri-Cleaner System

33101 Primary Screen

Quantity: One (1)
Type: Cowan type or equivalent
Material:
 Screen Plate; Stainless steel (SUS 304)
 Rotor; Mild steel
 Casing; Cast iron
Drive: 75 kW x 6P, V-belt drive

33102 Secondary Screen

Quantity: One (1)
Type: Cowan type or equivalent
Material:
 Screen Plate; Stainless steel (SUS 304)
 Rotor; Mild steel
 Casing; Cast iron
Drive: 15 kW x 4P, V-belt drive

33103 3-Stage Centri-Cleaner System

Type: Bauer 606H type
Quantity: 1st stage 24 units
 2nd stage 7 units
 3rd stage 2 units
Material:
 Cleaner Body; Plastic and Ceramic
 Header; Mild steel with SUS 304 lining
 (Inlet, Accept, Reject)
 Reject Receiver; Mild steel

33104 Brown Stock Extractor

Quantity: One (1)
Type: Cylinder mould type
Capacity: 80 BDT/24 Hrs.
Cylinder Size: 2,000 mm ϕ x 3,000 mm Face
Material: Parts in contact with stock to be made of stainless steel (SUS 304) and SUS 304 lining
Drive: Geared motor, 11 kW x 4P
 Spur gear drive

33105 Brown Stock Thickener

Quantity: One (1)
Type: Valveless type
Capacity: 80 BDT/24 Hrs.
Drim Size: 2,500 mm ϕ x 3,000 mm Face
Material: Parts in contact with stock to be made of stainless steel (SUS 304) and SUS 304 lining
Drive: Beier Cyclo Reducer
Drum; Geared motor, 5.5 kW x 4P
Discharge Screw;

33106 Ring Pipe & Dilution Nozzles

Quantity: One (1) set
Service: For unbleached stock high density tower
Material: Parts in contact with water to be made of stainless steel (SUS 304)

33201 Primary Screen Feed Pump

Quantity: One (1)
Service: Thickener Filtrate Tank discharge
Type: Centrifugal
Capacity: 4.2 m³/min. x 21 m Head
Material: Cast iron
Impeller; Cast iron
Casing; Cast iron
Drive: 22 kW x 4P

33202 Primary Screen Accept Pump

Quantity: One (1)
Service: Primary screen Accept Tank discharge
Type: Centrifugal
Capacity: 7.7 m³/min. x 10 m Head
Material: Cast iron
Impeller; Cast iron
Casing; Cast iron
Drive: 18.5 kW x 4P

33203	Secondary Screen Feed Pump	Quantity: One (1) Service: Primary Screen Reject Tank discharge Type: Centrifugal Capacity: 0.4 m ³ /min. x 21 m Head Material: Impeller; Cast iron Casing; Cast iron Drive: 5.5 kW x 4P
33204	1st Stage Cleaner Feed Pump	Quantity: One (1) Service: Thickener Filtrate Tank discharge Type: Centrifugal Capacity: 11.4 m ³ /min. x 56 m Head Material: Impeller; Cast iron Casing; Cast iron Drive: 150 kW x 4P
33205	2nd Stage Cleaner Feed Pump	Quantity: One (1) Service: 1st Stage Cleaner Reject Receiver discharge Type: Centrifugal Capacity: 3.0 m ³ /min. x 35 m Head Material: Impeller; Cast iron Casing; Cast iron Drive: 30 kW x 4P
33206	3rd Stage Cleaner Feed Pump	Quantity: One (1) Service: 2nd Stage Cleaner Reject Receiver discharge Type: Centrifugal Capacity: 0.7 m ³ /min. x 35 m Head Material: Impeller; Cast iron Casing; Cast iron Drive: 11 kW x 4P

- 33207 **White Water Pump**
- Quantity: One (1)
Service: Thickener Filtrate Tank discharge
 to dilute stock of cleaning system
Type: Centrifugal
Capacity: 2.5 m³/min. x 20 m Head
Material:
 Impeller; Cast iron
 Casing; Cast iron
Drive: 15 kW x 4P
- 33208 **White Water Pump**
- Quantity: One (1)
Service: Thickener Filtrate Tank discharge
 to dilute stock of screens
Type: Centrifugal
Capacity: 1.8 m³/min. x 25 m Head
Material:
 Impeller; Cast iron
 Casing; Cast iron
Drive: 15 kW x 4P
- 33209 **White Water Pump**
- Quantity: One (1)
Service: Thickener Filtrate Tank discharge
 to Brown Stock Washer
Type: Centrifugal
Capacity: 1.5 m³/min. x 24 m Head
Material:
 Impeller; Cast iron
 Casing; Cast iron
Drive: 11 kW x 4P
- 33210 **H.D. Tower Pump**
- Quantity: One (1)
Service: H.D. Tower discharge
Type: Centrifugal
Capacity: 1.9 m³/min. x 40 m Head
Material:
 Impeller; Cast iron
 Casing; Cast iron
Drive: 30 kW x 4P

- 33211 White Water Pump
- Quantity: One (1)
 Service: To dilute stock of H.D. Tower
 Type: Centrifugal
 Capacity: 1.1 m³/min. x 25 m Head
 Material:
 Impeller; Cast iron
 Casing; Cast iron
 Drive: 11 kW x 4P
- 33301 H.D. Tower Agitator
- Quantity: One (1)
 Type: Horizontal, Propeller type
 Size: 920 mm ϕ
 Material: Cast iron & Stainless steel castings (SCS 13)
 Drive: 22 kW x 6P motor, V-belt drive
- 33401 Primary Screen Head Box
- Quantity: One (1)
 Material: Mild steel
- 33402 Primary Screen Accept Tank
- Quantity: One (1)
 Volume: 60 m³
 Main Dimension: 3,600 mm ϕ x 6,000 mm Height
 Material: Mild steel
- 33403 Primary Screen Reject Tank
- Quantity: One (1)
 Volume: 15 m³
 Main Dimension: 2,000 mm ϕ x 5,000 mm Height
 Material: Mild steel
- 33404 Cleaner Rejects Receiver
- Quantity: Three (3)
 Material: Parts in contact with stock to be made of stainless steel (SUS 304)

- 33405 **Thickener Filtrate Tank**
- Quantity: One (1)
 Volume: 120 m³
 Material: Mild steel
- 33406 **High Density Tower**
- Quantity: One (1)
 Volume: 250 m³
 Material: Mild steel
- 33407 **Secondary Screen Head Box**
- Quantity: One (1)
 Material: Mild steel
- 33601 **Scaffolding**
- Quantity: One (1) set
 Service: For Cleaners, Thickener
 Material: Mild steel
- 33701 **Piping, Valves and Fittings**
- One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 34. BLEACHING

34000

Design Basis

- 1) **Capacity:** 75 BDT/D at inlet
- 2) **Sequence:** C-E-H
- 3) **Shrinkage:** 8% based on Unbleached pulp
- 4) **Bleaching Condition**

	C	E	H
Temp. °C	-	60	40
Retention Time (min.)	60	120	180
Consistency(%)	3.5	10	10
Additive Chemicals (% on BD pulp)	6.3	2.0	2.5 (as available chlorine)

- 34101 Chlorine Mixer
- Quantity: Two (2), Six (6) elements each
 Type: Inline type
 Capacity: 75 BDT/24 Hrs.
 Material: FRP
 Accessories: Chlorine Injector – 1 set
- 34102 Chlorine Washer
- Quantity: One (1)
 Type: Vacuum Drum Washer
 Capacity: 75 BDT/24 Hrs.
 Drum Size: 2,750 mm ϕ x 3,000 mm Face
 Material: All parts in contact with stock to be made of stainless steel (SUS 317L) and SUS 317L lining
 Drive:
 Drum; Beier Cyclo Reducer
 7.5 kW x 4P motor
 Discharge Screw; Geared motor, 5.5 kW x 4P
- 34103 Caustic Steam Mixer
- Quantity: One (1)
 Type: Single Shaft type
 Capacity: 750 BDT/24 Hrs.
 Material:
 Rotor; Stainless steel (SUS 304)
 Casing; Mild steel with SUS 304 lining
 Drive: 18.5 kW x 6P motor, V-belt drive
 Remarks: Insulated
- 34104 Caustic Washer
- Quantity: One (1)
 Type: Vacuum Drum Washer
 Capacity: 75 BDT/24 Hrs.
 Drum Size: 2,750 mm ϕ x 3,000 mm Face
 Material: All parts in contact with stock to be made of stainless steel (SUS 304) and SUS 304 lining
 Drive:
 Drum; Beier Cyclo Reducer
 7.5 kW x 4P motor
 Discharge Screw; Geared motor, 5.5 kW x 4P

34105 Hypo Steam Mixer

Quantity: One (1)
Type: Single Shaft type
Capacity: 75 BDT/24 Hrs.
Material: Stainless steel (SUS 316)
Rotor: Mild steel with SUS 316 lining
Casing: Mild steel with SUS 316 lining
Drive: 18.5 kW x 6P motor, V-belt drive
Remarks: Insulated

34106 Hypo Washer

Quantity: One (1)
Type: Vacuum Drum Washer
Capacity: 75 BDT/24 Hrs.
Drum Size: 2,750 mm ϕ x 3,000 mm Face
Material: All parts in contact with stock to be made of stainless steel (SUS 316) and SUS 316 lining
Drive: Beier Cyclo Reducer
Drum: 7.5 kW x 4P motor
Discharge Screw: Geared motor, 5.5 kW x 4P

34107 Washer Hood Fan

Quantity: One (1)
Type: Axial
Capacity: 200 Nm³/min. x 60 mm Aq.
Material: FRP
Drive: 7.5 kW x 4P motor, V-belt drive

34108 Washer Blow-Off Fan

Quantity: One (1)
Type: Turbo-fan
Capacity: 60 Nm³/min. x 400 mm Aq.
Material: Mild steel
Drive: 11 kW x 4P motor, V-belt drive

34109 Ring Pipe & Dilution Nozzles

Quantity: One (1) set
Service:
Caustic Tower Material: Stainless steel (SUS 304)
Hypo Tower Material: Stainless steel (SUS 304)
H.D. Tower Material: Stainless steel (SUS 304)

34201 Caustic Tower Pump

Quantity: One (1)
Service: Caustic Tower discharge
Type: Centrifugal
Capacity: 2 m³/min. x 25 m Head
Material:
Impeller; Stainless steel castings (SCS 13)
Casing; Stainless steel castings (SCS 13)
Drive; 18.5 kW x 4P

34202 Hypo Tower Pump

Quantity: One (1)
Service: Hypo Tower discharge
Type: Centrifugal
Capacity: 2 m³/min. x 25 m Head
Material:
Impeller; Stainless steel castings (SCS 14)
Casing; Stainless steel castings (SCS 14)
Drive; 18.5 kW x 4P

34203 H.D. Tower Pump

Quantity: One (1)
Service: H.D. Tower discharge
Type: Centrifugal
Capacity: 1.5 m³/min. x 15 m Head
Material:
Impeller; Stainless steel castings (SCS 13)
Casing; Stainless steel castings (SCS 13)
Drive; 7.5 kW x 4P

- 34204 Seal Pit Pump
- Quantity: One (1)
 Service: Chlorine Seal Pit discharge
 to dilute stock
 Type: Centrifugal
 Capacity: 4.8 m³/min. x 23 m Head
 Material:
 Impeller; Stainless steel castings (SCS 16)
 Casing; Cast iron with Hard rubber lining
 Drive: 30 kW x 4P
- 34205 Seal Pit Pump
- Quantity: One (1)
 Service: Chlorine Seal Pit discharge
 to Wire Shower
 Type: Centrifugal
 Capacity: 0.9 m³/min. x 30 m Head
 Material:
 Impeller; Stainless steel castings (SCS 16)
 Casing; Cast iron with Hard rubber lining
 Drive: 11 kW x 4P
- 34206 Seal Pit Pump
- Quantity: One (1)
 Service: Chlorine Seal Pit discharge
 to dilute stock
 Type: Centrifugal
 Capacity: 4.8 m³/min. x 23 m Head
 Material:
 Impeller; Stainless steel castings (SCS 13)
 Casing; Stainless steel castings (SCS 13)
 Drive: 30 kW x 4P
- 34207 Seal Pit Pump
- Quantity: One (1)
 Service: Chlorine Seal Pit discharge
 to Wire Shower
 Type: Centrifugal
 Capacity: 0.9 m³/min. x 30 m Head
 Material:
 Impeller; Stainless steel castings (SCS 13)
 Casing; Stainless steel castings (SCS 13)
 Drive: 11 kW x 4P

- 34208 **Seal Pit Pump**
- Quantity: One (1)
 Service: Caustic Seal Pit discharge to dilute stock of Caustic Tower
 Type: Centrifugal
 Capacity: 1.45 m³/min. x 35 m Head
 Material:
 Impeller; Stainless steel castings (SCS 13)
 Casing; Stainless steel castings (SCS 13)
 Drive: 15 kW x 4P
- 34209 **Seal Pit Pump**
- Quantity: One (1)
 Service: Hypo Seal Pit discharge to dilute stock
 Type: Centrifugal
 Capacity: 4.8 m³/min. x 23 m Head
 Material:
 Impeller; Stainless steel castings (SCS 14)
 Casing; Stainless steel castings (SCS 14)
 Drive: 30 kW x 4P
- 34210 **Seal Pit Pump**
- Quantity: One (1)
 Service: Hypo Seal Pit discharge to Wire Shower
 Type: Centrifugal
 Capacity: 0.9 m³/min. x 30 m Head
 Material:
 Impeller; Stainless steel castings (SCS 14)
 Casing; Stainless steel castings (SCS 14)
 Drive: 11 kW x 4P
- 34211 **Seal Pit Pump**
- Quantity: One (1)
 Service: Hypo Seal Pit discharge to dilute stock of Hypo Tower
 Type: Centrifugal
 Capacity: 1.45 m³/min. x 35 m Head
 Material:
 Impeller; Stainless steel castings (SCS 14)
 Casing; Stainless steel castings (SCS 14)
 Drive: 15 kW x 4P

34212 Fresh Water Pump

Quantity: One (1)
Service: Chlorine Injector feed
Type: Centrifugal
Capacity: 0.4 m³/min. x 45 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 7.5 kW x 4P motor

34213 Hot Water Pump

Quantity: One (1)
Service: To dilute stock of H.D. Tower
Type: Centrifugal
Capacity: 0.85 m³/min. x 25 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 7.5 kW x 4P

34301 Chlorine Tower Agitator

Quantity: One (1)
Type: Horizontal, Propeller type
Size: 940 mmφ
Material: Cast iron with Hard rubber lining
Drive: 22 kW x 6P motor, V-belt drive

34302 Caustic Tower Agitator

Quantity: One (1)
Type: Horizontal, Propeller type
Size: 940 mmφ
Material:
Propeller; Stainless steel castings (SCS 13)
Body; Cast iron with SUS 304 lining

34303 Hypo Tower Agitator

Quantity: One (1)
Type: Horizontal, Propeller type
Size: 940 mmφ
Material:
Propeller; Stainless steel castings (SCS 14)
Body; Cast iron with SUS 316 lining
Drive: 22 kW x 6P motor, V-belt drive

34304	H.D. Tower Agitator	Quantity: One (1) Type: Horizontal, Propeller type Size: 920 mm ϕ Material: Propeller; Stainless steel castings (SCS 13) Body; Cast iron Drive: 22 kw x 6P motor, V-belt drive
34401	Chlorine Tower	Quantity: One (1) Type: Up-flow type Volume: 95 m ³ Material: Mild steel with Hard rubber lining
34402	Caustic Tower	Quantity: One (1) Type: Down-flow Volume: 68 m ³ Material: Mild steel and SUS 304 lining on the top of 4,000 mm height Remarks: Insualted
34403	Hypo Tower	Quantity: One (1) Type: Down-flow Volume: 102 m ³ Material: Mild steel with FRP lining
34404	High Density Tower	Quantity: One (1) Volume: 250 m ³ Material: Mild steel
34405	Washer Seal Pit	Quantity: Three (3) Volume: 30 m ³ Main Dimension: 2,450 mm ϕ x 7,080 mm Height Material: FRP

34601 Scaffolding

Quantity: One (1) set
Service: For Washer, Mixer and Towers
Material: Mild steel

34701 Piping, Valves and Fittings

One (1) set of pipes, valves and fittings for this department will be supplied.

34702 Washer Hood & Duct

Quantity: Three (3)
Type: Closed type
Material: FRP

DEPARTMENT 35. PULP MACHINE AND FINISHING

1982

35000

Design Basis

1) Capacity:

75 ADT/D

2) Final Product

Pulp Sheet Moisture:

10-15%

Pulp Sheet Basic Weight:

1,000-1,300 g/m²

Pulp Sheet Size:

800 mmW x 800 mmL

Pulp Sheet Bale Weight:

100-150 kg

35101 Closed Head Box

Quantity: One (1) set
Type: Closed type
Web Width: 1,750 mm
Material: All part in contact with stock to be made of stainless steel (SUS 304)

Consist of:

1 - Head box: Closed pressure type
2 - Support stands: Mild steel welded
1 - Pressure gauge: Diaphragm type
2 - Base plate: Cast iron

35102 Wire Part

Quantity: One (1) set
Type: Double wire press type
Wire Width: 1,750 mm
Machine Speed: 23.5 m/min.
Drive Power: 37 kW
Nip Pressure: Pre-press max. 20 kg/cm
Main-press max. 120 kg/cm

Consist of:

2 - Deckle seals: For wedge shaped inlet section
2 - Breast rolls: Steel tube rubber covered
Various table rolls: Steel tube rubber covered
2 - Main press rolls: Cast steel with special rubber covered
2 - Wire guide rolls: Steel tube rubber covered
2 - Automatic wire guide device: Pneumatic operated
2 - Wire stretchers: Tensioning of top and bottom wires, pneumatic control
1 - Loading device: For the prepress section and the main press section
1 - Doctor: Blades of plastic materials, doctor support of steel
2 - Spray pipes: For cleaning of the wire
1 - White water trays: For the collecting of white water from D.W.P. SUS 304 materials
1 - Frame & Wire changing device: Welded of steel, cantilever type press with A.C. motor 37 kW including motor and reducing gear box
4 - Foundation rails: Cast iron including foundation bolts

2 - Oscillating H.P. shower with save all: For top & bottom wire cleaning
 2 - Knock off shower: For wire cloth cleaning
 2 - Water edge cutter: For the cutting of pulp sheet edge
 1 - Cross sheet cutter: Water nozzle type by hand operation
 Wire cloth: One (1) set top and bottom wire cloth

35103 No. 1 Heavy Duty Press
Quantity: One (1) set
Wire Width: 1,750 mm
Machine Speed: 23.5 m/min. on Normal operation
Drive Power: 30 kW
Nip Pressure: Max. 225 kg/cm
Consist of:
 2 - Press rolls: Cast steel, journals of steel
 1 - Frame & wire changing device: Welded of steel, cantilever type
 1 - Loading device: Pneumatic operation type
 1 - White water tray: SUS 304 materials
 Various wire rolls: Steel tube, rubber covered
 2 - Wire guide rolls: Steel tube, rubber covered
 2 - Automatic wire guide devices: Pneumatic operation
 2 - Wire stretchers: Tensioning of the top and bottom wires, pneumatic control
 1 - Regulating gear: For the drive of the heavy duty press with A.C. motor 30 kW including motor and reducing gear box
 4 - Foundation rails: Cast iron, including foundation bolts
 2 - Oscillating H.P. shower with save all: For top and bottom wire cloth cleaning
 Wire cloth: One (1) set for top and bottom position

35104 No. 2 Heavy Duty Press
Quantity: One (1) set
Wire Width: 1,750 mm
Machine Speed: 23.5 m/min. on Normal operation
Drive Power: 30 kW
Nip Pressure: Max. 225 kg/cm
Consist of:
 2 - Press rolls: Cast steel, journals of steel with antifriction bearings

1 - Frame & felt changing device: Welded of steel, cantilever type
1 - Loading device: Pneumatic operation type
1 - White water tray: SUS 304 materials
Various felt rolls: Steel tube, rubber covered with antifriction bearing
2 - Wire guide rolls: Steel tube, rubber covered with antifriction bearing
2 - Automatic wire guide devices: Pneumatic operation
2 - Felt stretchers: Tensioning of the top and bottom felts, pneumatic controlled
1 - Regulating gear: For the drive of the heavy duty press with A.C. motor 30 kW including motor and reducing gear box
4 - Foundation rails: Cast iron, including foundation bolts
2 - Oscillating H.P. shower with save all: For top and bottom wire cloth cleaning
Felt cloth: One (1) set for top and bottom position

35105 Dryer Part
Quantity: One (1) set
Type: Air borne system pulp dryer
Web Width: 1,700 mm
Machine Speed: 23.5 m/min. on Normal operation
Main Dimension: 6,000 mmW x 17,000 mmL x 5,500 mmH
Consist of: Dryer
 Heat Recovery System
 Supply Air System
 Exhaust Air System
 Driving System
 Steam Drainage System

35106 Cross Cutter and Lay Boy
Quantity: One (1) set
Working Width: 1,600 mm
Size of Pulp Sheet: 800 mm x 800 mm
Height of Piles: Max. 1,000 mm
Machine Speed: Max. 30 m/min.
Drive Power: 11 kW for cutter & slitter
 3.7 kW for table lifter
 0.4 kW for sheet roll
 0.4 kW for fork

Consist of:

- 1 - Feed roll: Steel tube with rubber covered with antifriction bearings
- 1 - Rotating knife roll: Knife of tempered steel roll body of gray cast iron
- 1 - Bottom knife: Knife of tempered steel, knife body of gray cast iron
- 1 - Conveyor device: Adjustable cutting angle
Transfer of the pulp sheets from Dryer to the Cross cutter by the belt
- 1 - Frame: Cutter frame of welded steel lay boy frame of welded steel
- 1 - Sheet catcher fork: Receiving the pulp sheets while finished pile move out of machine
- 1 - Table lifter: Welded steel with hydraulic unit including motor
- 1 - Jogger: Jogger plate with driving device
- 1 - Control equipment: For the cutter and lay boy
- 1 - Slitter:

35107 **Baling Equipment**

Quantity: One (1) set

Type: Circulation type

Bale Dimension: 800 mm x 800 mm x 800 mm Height

Bale Weight: Approx. 150 kg

Operation Cycle: Approx. 170 sec./bale

Steel Wire: 2.6-3.2 mm ϕ

Consist of:

- 1 - Hydraulic baling press: Construction of 4 poles, up and down operation including hydraulic and electric control equipment, 800 tons capacity
- 1 - Scale: Total weight of 1,000 kg and for the pulp bale weight of max. 200 kg (min. gauge indication of 1.0 kg)
Size of scale; 900 x 900 mm²
- 8 - Carts: Welded of steel plate with wheel
Cart size; 820 mm x 820 mm²
- 1 - Rail: Endless construction, steel made
- 1 - Wire straightening machine & looper

85108 **Dry Broke Pulper**

Quantity: One (1)

35109	Hoist	<p>Quantity: One (1) set</p> <p>Service: Roll changing</p> <p>Type: Electric hoist and Gear trolley</p> <p>Capacity: 5 tons</p>
35201	Machine Chest Pump	<p>Quantity: One (1)</p> <p>Service: Machine Chest discharge</p> <p>Type: Centrifugal</p> <p>Capacity: 2.4 m³/min. x 20 m Head</p> <p>Stock Consistency: 3.5%</p> <p>Material:</p> <p style="padding-left: 20px;">Impeller; Stainless cast steel (SCS 13)</p> <p style="padding-left: 20px;">Casing; Stainless cast steel (SCS 13)</p> <p>Drive: 15 kW x 4P motor</p>
35202	White Water Pump	<p>Quantity: Two (2)</p> <p>Service: White Water Pit discharge</p> <p>Type: Centrifugal</p> <p>Capacity: 2.5 m³/min. x 10 m Head</p> <p>Stock Consistency: 3.5%</p> <p>Material:</p> <p style="padding-left: 20px;">Impeller; Stainless cast steel (SCS 13)</p> <p style="padding-left: 20px;">Casing; Stainless cast steel (SCS 13)</p> <p>Drive: 11 kW x 4P motor</p>
35203	Wet Broke Pump	<p>Quantity: One (1)</p> <p>Service: Wet Broke Pit discharge</p> <p>Type: Centrifugal</p> <p>Capacity: 1.5 m³/min. x 10 m Head</p> <p>Material:</p> <p style="padding-left: 20px;">Impeller; Stainless cast steel (SCS 13)</p> <p style="padding-left: 20px;">Casing; Stainless cast steel (SCS 13)</p> <p>Drive: 7.5 kW x 4P motor</p>

35204	High Pressure Pump	
	Quantity:	One (1)
	Service:	Wire and Felt shower
	Type:	Multi-stage Centrifugal type
	Capacity:	0.35 m ³ /min. x 250 m Head
	Material:	
	Impeller;	Stainless cast steel (SCS 13)
	Casing;	Cast iron
	Drive:	22 kW x 2P motor
35205	Drain Pump	
	Quantity:	One (1)
	Service:	Felt suction tube
	Type:	Vertical
	Capacity:	0.2 m ³ /min. x 8 m Head
	Material:	
	Impeller;	Stainless cast steel (SCS 13)
	Casing;	Cast iron
	Drive:	1.5 kW x 4P motor
35206	Vacuum Pump	
	Quantity:	One (1)
	Service:	Lay drum
	Type:	Nash
	Capacity:	5.5 m ³ /min. x 500 m Hg
	Material:	Cast iron
	Drive:	15 kW x 4P motor
	Accessories:	Separate tank Vacuum gauge Silencer tank
35207	Vacuum Pump	
	Quantity:	One (1)
	Service:	Felt suction tube
	Type:	Nash
	Capacity:	13 m ³ /min. x 300 m Hg
	Material:	Cast iron
	Drive:	30 kW x 4P motor
	Accessories:	Separate tank Vacuum gauge Silencer tank

- 35208 Dry Broke Pump
- Quantity: One (1)
 Service: Dry Broke Pulper to Machine Chest
 Type: Centrifugal
 Capacity: 0.5 m³/min. x 10 m Head
 Stock Consistency: 4%
 Material:
 Impeller; Stainless cast steel (SCS 13)
 Casing; Stainless cast steel (SCS 13)
 Drive:
- 35209 Condensate Pump
- Quantity: One (1)
 Service: Condensate Tank discharge,
 to Power Plant
 Type: Centrifugal
 Capacity:
 Material: Cast iron
 Drive:
- 35301 Machine Chest Agitator
- Quantity: One (1)
 Type: Horizontal, Propeller type
 Size: 1,220 mm ϕ
 Material:
 Propeller; Stainless cast steel (SCS 13)
 Body; Cast iron
 Drive: 30 kW x 4P motor, V-belt drive
- 35302 Wet Broke Pit Agitator
- Quantity: One (1)
 Type: Paddle type
 Material: All part in contact with stock to be made of
 stainless steel (SUS 304) and SUS 304 lining
 Drive: 11 kW x 4P motor, V-belt drive
- 35304 Machine Chest
- Quantity: One (1)
 Volume: 35 m³
 Main Dimension: 3,350 mm ϕ x 4,500 mmH
 Material: Mild steel

35402 **White Water Pit**

Quantity: One (1)
Volume: 20 m³
Main Dimension: 1,800 mmW x 6,500 mmL x 4,000 mmD
Material: Mild steel with SUS 304 lining

35403 **Wet Broke Pit**

Quantity: One (1)
Volume: 25 m³
Main Dimension: 1,800 mmW x 8,000 mmL x 4,000 mmD
Material: Mild steel with SUS 304 lining

35404 **Condensate Tank**

Quantity: One (1)
Volume: 30 m³
Main Dimension: 2,000 mm x 2,000 mm x 8,000 mm Height
Material: Mild steel
Remarks: Insulated

35601 **Scaffolding**

Quantity: One (1) set
Service: Head Box to H.D. Press and Wet Broke Pit
Material: Mild steel

35701 **Piping, Valves and Fittings**

One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 51. BLACK LIQUOR EVAPORATOR & INCINERATOR

51000 Design Base

Weak Black Liquor:	68 m ³ /Hr at 6% solid
Strong Black Liquor:	40–45% solid
Evaporation:	59 kg/Hr
Weak Black Liquor Temp.:	80°C
Black Liquor Calorific Value:	2,500 Kcal/kg at dry solid
Fuel Calorific Value:	Natural Gas
	8,700 Kcal/Nm ³ at LCV

51101	No. 1 Effect Evaporator	Quantity: Two (2), one is spare Type: Shell & Tube Main Dimension: 2,700 ϕ /3,400 ϕ x 12,800 H Material: Shell; Mild steel Tube; SUS 304
51102	No. 2 Effect Evaporator	Quantity: One (1) Type: Shell & Tube Main Dimension: 2,700 ϕ /3,500 ϕ x 12,800 H Material: Shell; Mild steel Tube; SUS 304
51103	No. 3 Effect Evaporator	Quantity: One (1) Type: Shell & Tube Main Dimension: 2,700 ϕ /3,800 ϕ x 12,800 H Material: Shell; Mild steel Tube; SUS 304
51104	Condenser	Quantity: One (1) Type: Surface Condenser Main Dimension: Material: Mild steel
51105	Vacuum System	Quantity: One (1) set Type: 2-Stage Steam Ejectors Material: Cast iron with SUS 304
51106	Stack	Quantity: One (1) Type: Vertical Main Dimension: 700 ϕ /1,500 ϕ x 20,000 H Material: Mild steel

51107	Venturi-Scrubber		
	Quantity:	One (1)	
	Main Dimension:	750 ϕ x 2,000 L	
	Material:	SUS 304	
51108	Incinerator		
	Quantity:	One (1)	
	Type:	Vertical, Water Jacket	
	Main Dimension:	3,000 ϕ x 7,000 H	
	Material:	Mild steel with refractory.	
51109	Blower		
	Quantity:	One (1)	
	Type:	Turbo	
	Capacity:	15,000 Nm ³ /min. x 1,800 mm Aq.	
	Material:	Mild steel	
	Drive:	150 kW motor	
51110	Cooler		
	Quantity:	One (1)	
	Type:	Plate	
	Material:	SUS 304	
51201	Weak Black Liquor Pump		
	Quantity:	Two (2)	
	Type:	Centrifugal	
	Capacity:	45 m ³ /Hr x 15 m Head	
	Material:	Cast iron	
	Drive:	5.5 kW motor	
51202	No. 3 Discharge Pump		
	Quantity:	One (1)	
	Type:	Centrifugal	
	Capacity:	30 m ³ /Hr x 15 m Head	
	Material:	Cast iron	
	Drive:	3.7 kW motor	

- 51203 **No. 2 Discharge Pump**
- Quantity: One (1)
Type: Centrifugal
Capacity: 20 m³/Hr x 15 m Head
Material: Cast iron
Drive: 2.2 kW motor
- 51204 **No. 1 Discharge Pump**
- Quantity: One (1)
Type: Centrifugal
Capacity: 12 m³/Hr x 15 m Head
Material: Cast iron
Drive: 1.5 kW motor
- 51205 **Evaporator Circulation Pump**
- Quantity: Four (4)
Type: Centrifugal
Capacity: 300 m³/Hr x 8 m Head
Material: Mild steel
Drive: 15 kW motor
- 51206 **Condensate Pump**
- Quantity: One (1)
Type: Centrifugal
Capacity: 35 m³/Hr x 15 m Head
Material: Mild steel
Drive: 3.7 kW motor
- 51207 **Hot Water Pump**
- Quantity: One (1)
Type: Centrifugal
Capacity: 350 m³/Hr x 15 m Head
Material: Cast iron
Drive: 22 kW motor
- 51208 **Venturi Circulation Pump**
- Quantity: One (1)
Type: Centrifugal
Capacity: 10 m³/Hr x 25 m Head
Material: Cast iron
Drive: 3.7 kW motor

51209	Strong Black Liquor Pump	
	Quantity:	Two (2), one is spare
	Type:	Centrifugal
	Capacity:	8 m ³ /Hr x 35 m Head
	Material:	Cast iron
	Drive:	5.5 kW motor
51210	Smelt Dissolver Circulation Pump	
	Quantity:	Two (2), one is spare
	Type:	Centrifugal
	Capacity:	100 m ³ /Hr x 25 m Head
	Material:	Cast iron
	Drive:	15 kW motor
51211	Cooling Water Circulation Pump	
	Quantity:	Two (2), one is spare
	Type:	Centrifugal
	Capacity:	50 m ³ /Hr x 15 m Head
	Material:	Cast iron
	Drive:	5.5 kW motor
51212	Green Liquor Pump	
	Quantity:	One (1)
	Type:	Centrifugal
	Capacity:	10 m ³ /Hr x 15 m Head
	Material:	Cast iron
	Drive:	2.2 kW motor
51301	Smelt Dissolver Agitator	
	Quantity:	One (1)
	Type:	Horizontal
	Drive:	7.5 kW motor
51401	Weak Black Liquor Tank	
	Quantity:	Two (2)
	Volume:	400 m ³ each
	Material:	Mild steel

- 51402 **Strong Black Liquor Tank**
- Quantity: One (1)
Volume: 200 m³
Material: Mild steel
- 51403 **Smelt Dissolver Tank**
- Quantity: One (1)
Main Dimension: 3,500 ϕ x 3,500 H
Material: Mild steel with refractory
- 51404 **Water Head Tank**
- Quantity: One (1)
Main Dimension: 1,500 ϕ x 1,000 H
Material: Mild steel
- 51601 **Scaffolding**
- Quantity: One (1) set
Service: Evaporator, Condenser and Incinerator
Material: Mild steel
- 51701 **Piping, Valves, Fittings and Duct**
- One (1) set of pipes, valves, fittings and duct for this department will be supplied.

DEPARTMENT 52. RECAUSTICIZING

52000

Design Basis

White Liquor Production:

230 m³/D

Active Alkali:

120 kg/m³ as NaOH

Causticity:

80-85%

Make-up Chemical:

23 m³/D at 120 kg/m³ as NaOH
from Electrolysis plant

52101	Green Liquor Clarifier	
	Quantity:	One (1)
	Type:	Unit type thickener with storage on top
	Main Dimension:	6,600 mm ϕ x 8,500 mm H
	Storage Volume:	140 m ³
	Material:	
	Tank;	Mild steel
	Raking Mechanism:	Stainless steel (SUS 304)
	Drive:	
	Rake;	Geared motor 0.75 kW x 4P
	Rake-lift;	Geared motor 0.4 kW x 4P
	Remarks:	Insulated
52102	Dregs Filter	
	Quantity:	One (1)
	Type:	Vacuum drum filter and Air blow discharge
	Drum Size:	3,120 mm ϕ x 1,200 mmH
	Material:	Mild steel
		Filter cloth – Polypropylene
	Drive:	
	Drum;	Beier cyclo reducer 0.4 kW x 4P motor
	Agitator;	Geared motor 0.75 kW x 4P
52103	Green Liquor Heater	
	Quantity:	One (1)
	Type:	Inline direct heater
	Green Liquor Capacity:	11.5 m ³ /Hr, normal rate
	Stem:	220 kg/Hr at 2.5 kg/cm ² G
	Material:	Stainless cast steel (SCS 13)
52104	Lime Slaker	
	Quantity:	One (1)
	Type:	Combination type
	Mixer Tank:	1,500 mm ϕ x 1,500 mm Height
	Classifier:	5,000 mm Length
	Material:	Stainless steel (SUS 304)
	Drive:	
	Mixer;	Geared motor 2.2 kW x 4P
	Classifier;	Geared motor 0.75 kW x 4P
	Remarks:	Insulated

52105	Causticizer	
	Quantity:	Three (3)
	Type:	Vertical
	Main Dimension:	2,400 mm ϕ x 2,400 mm Height
	Material:	Stainless steel (SUS 304)
	Drive:	Geared motor 2.2 kW x 4P
	Remarks:	Insulated
52106	White Liquor Clarifier	
	Quantity:	One (1)
	Type:	Unit type thickener with storage on top
	Main Dimension:	6,600 mm ϕ x 8,500 mm Height
	Storage Volume:	140 m ³
	Material:	
	Tank;	Mild steel
	Raking Mechanism;	Stainless steel (SUS 304)
	Drive:	
	Rake;	Geared motor 1.5 kW x 4P
	Rake-lift;	Geared motor 0.4 kW x 4P
	Remarks:	Insulated
52107	Lime Mud Washer	
	Quantity:	One (1)
	Type:	Unit type thickener with storage on top
	Main Dimension:	6,600 mm ϕ x 8,500 mm Height
	Storage Volume:	140 m ³
	Material:	
	Tank;	Mild steel
	Raking Mechanism;	Stainless steel (SUS 304)
	Drive:	
	Rake;	Geared motor 1.5 kW x 4P
	Rake-lift;	Geared motor 0.4 kW x 4P
	Remarks:	Insulated
52108	Lime Mud Filter	
	Quantity:	One (1)
	Type:	Vacuum drum filter precoat type
	Drum Size:	1,800 mm ϕ x 1,900 mm Face
	Material:	Mild steel
		Filter cloth – Polypropylene
	Drive:	
	Drum;	Beier cyclo reducer
		0.75 kW x 4P motor
	Agitator;	Geared motor 0.75 kW x 4P

- 52109 **Grit & Dregs Conveyor**
- Quantity: One (1)
Type: Belt conveyor
Size: 450 mmW x 10,000 mm Length
Material: Mild steel
Drive: Geared motor 1.5 kW x 4P
- 52201 **Green Liquor Pump**
- Quantity: Two (2), one for spare
Service: G.L.C. discharge to Lime Slaker
Type: Centrifugal
Capacity: 230 l/min. x 10 m Head
Material: Stainless cast steel (SCS 13)
 Impeller; Cast iron
 Casing; 2.2 kW x 4P motor
Drive: 2.2 kW x 4P motor
- 52202 **Underflow Pump**
- Quantity: Two (2), one for spare
Service: G.L.C. discharge to Dregs Filter
Type: Air operated diaphragm pump
Capacity: 35 l/min. x 10 m Head
Material: Cast iron with rubber lining
- 52203 **Filtrate Pump**
- Quantity: One (1)
Service: Dregs Filter
Type: Centrifugal
Capacity: 20 l/min. x 10 m Head
Material: Stainless cast steel (SCS 13)
 Impeller; Cast iron
 Casing; 0.75 kW x 4P motor
Drive: 0.75 kW x 4P motor
- 52204 **Vacuum Pump**
- Quantity: One (1)
Service: Dregs Filter
Type: Nash

	Capacity:	4 m ³ /min. x 550 mm Hg
	Material:	Cast iron
	Drive:	7.5 kW x 4P motor, V-belt drive
	Accessories:	Filtrate Receiver 250 mm ϕ x 600 mmH Condenser Scrubber 380 mm ϕ x 2,000 mmH
52205	White Liquor Pump	
	Quantity:	Two (2), one for spare
	Service:	W.L.C. discharge to Cooking
	Type:	Centrifugal
	Capacity:	0.3 m ³ /min. x 10 m Head
	Material:	
	Impeller;	Stainless cast steel (SCS 13)
	Casing;	Stainless cast steel (SCS 13)
	Drive:	5.5 kW x 4P motor
52206	Underflow Pump	
	Quantity:	Two (2), one for spare
	Service:	W.L.C. discharge to Lime Mud Mixing Tank
	Type:	Centrifugal
	Capacity:	70 l/min. x 10 m Head
	Material:	
	Impeller;	Cast iron with Cr.
	Casing;	Cast iron with Cr.
	Drive:	1.5 kW x 4P motor, V-belt drive
52207	Weak Liquor Pump	
	Quantity:	One (1)
	Service:	L.M.S. discharge to Smelt dissolver
	Type:	Centrifugal
	Capacity:	0.3 m ³ /min. x 10 m Head
	Material:	
	Impeller;	Stainless cast steel (SCS 13)
	Casing;	Cast iron
	Drive:	3.7 kW x 4P motor
52208	Underflow Pump	
	Quantity:	One (1)
	Service:	L.M.S. discharge to Lime Mud Storage
	Type:	Centrifugal
	Capacity:	70 l/min. x 30 m Head

Material:
 Impeller; Cast iron with Cr.
 Casing; Cast iron with Cr.
 Drive: 1.5 kW x 4P motor, V-belt drive

52209 Lime Mud Pump

Quantity: Two (2), one for spare
 Service: Lime Mud Storage discharge to Lime Mud Filter
 Type: Centrifugal
 Capacity: 70 l/min. x 30 m Head
 Material:
 Impeller; Cast iron with Cr.
 Casing; Cast iron with Cr.
 Drive: 2.2 kW x 4P motor, V-belt drive

52210 Filtrate Pump

Quantity: One (1)
 Service: Lime Mud Filter
 Type: Centrifugal
 Capacity: 0.1 m³/min. x 10 m Head
 Material:
 Impeller; Stainless cast steel (SCS 13)
 Casing; Cast iron
 Drive: 1.1 kW x 4P motor

52211 Vacuum Pump

Quantity: One (1)
 Service: Lime Mud Filter
 Type: Nash
 Capacity: 13 m³/min. x 500 mm Hg
 Material: Cast iron
 Drive: 22 kW x 4P motor, V-belt drive
 Accessories: Filtrate Receiver 600 mm ϕ x 900 mmH
 Condenser Scrubber 900 mm ϕ x 2,400 mmH

52212 Overflow Pump

Quantity: One (1)
 Service: Dump Tank discharge
 Type: Centrifugal
 Capacity: 0.3 m³/min. x 30 m Head

	Material:	
	Impeller;	Stainless cast steel (SCS 13)
	Casing;	Cast iron
	Drive:	5.5 kW x 4P motor
52401	Lime Mud Mixing Tank	
	Quantity:	One (1)
	Type:	Cylindrical tank with mixer
	Main Dimension:	2,100 mm ϕ x 2,100 mm Height
	Material:	
	Tank;	Mild steel
	Mixer;	Stainless steel (SUS 304)
	Drive:	Geared motor 2.2 kW x 4P
	Remarks:	Insulated
52402	Lime Mud Storage Tank	
	Quantity:	One (1)
	Type:	Cylindrical tank with Agitator
	Volume:	19 m ³
	Main Dimension:	3,000 mm ϕ x 3,000 mm Height
	Material:	Mild steel
	Drive:	Geared motor 2.2 kW x 4P
	Remarks:	Insulated
52403	Dregs Head Tank	
	Quantity:	One (1)
	Size:	1,000 mm ϕ x 1,000 mm Height
	Material:	Mild steel
	Remarks:	Insulated
52404	Acid Tank	
	Quantity:	Two (2)
	Service:	For Dregs Filter and Lime Mud Filter
	Size:	1,000 mm ϕ x 1,000 mm Height
	Material:	FRP
52601	Scaffolding	
	Quantity:	One (1) set
	Service:	Lime Slaker, Causticizer, Dregs Filter and Lime Mud Filter
	Material:	Mild steel

52701

Pipes, Valves and Fittings

Supplies for the Department of Public Works

One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 53. LIME RECOVERY

Process Description

187

53000 Design Basis

Quick Lime Required:	24 T/D as 80% CaO
Lime Mud Charged:	31 T/D (Dry base as CaCO₃)
Lime Mud Moisture:	45%
Make-up Lime Stone:	17 T/D (Dry base as CaCO₃)
Lime Stone Purity:	90–92% as CaCO₃
Fuel Calorific Value:	Natural Gas
	8,700 Kcal/Nm³ at LCV

53101	Rotary Kiln		
	Quantity:	One (1)	
	Main Size:	1,900 mm ϕ x 47,000 mm Length	
	Capacity:	24 Tons/D of quick lime	
	Material:	Mild steel with brick and castable lined	
	Drive:	Main – 30 kW Gear unit – 1.5 kW Emergency – 7.5 kW	
53102	Lime Stone Crusher		
	Quantity:	One (1)	
	Type:	Hammer mill type	
	Capacity:	1.8 Tons/Hr	
	Material:	Mild steel	
	Drive:	5.5 kW x 2P	
	Accessories:	Hopper	
53103	Quick Lime Crusher		
	Quantity:	One (1)	
	Type:	Hammer mill type	
	Capacity:	2 Tons/Hr	
	Material:	Mild steel	
	Drive:	11 kW x 2P	
53104	Venturi Scrubber		
	Quantity:	One (1)	
	Type:		
	Capacity:	290 m ³ /min.	
	Material:	SUS 304	
53105	Heating Unit		
	Quantity:	One (1) set	
	Service:	Natural gas fired	
	Capacity:	4,420,000 Kcal/Hr	
53106	Primary Fan		
	Quantity:	One (1)	
	Capacity:	55 Nm ³ /min. x 500 mm Aq.	
	Material:	Mild steel	
	Drive:	11 kW x 4P	

53107	Exhaust Fan	Quantity:	One (1)
		Capacity:	360 m ³ /min. x 700 mm Aq.
		Material:	Mild steel
		Drive:	90 kW x 4P
53108	Screw Conveyor	Quantity:	One (1)
		Service:	Lime mud transfer
		Capacity:	3 Tons/Hr
		Drive:	3.7 kW x 4P geared motor
53109	Screw Feeder	Quantity:	One (1)
		Service:	Lime mud feeder
		Capacity:	3 Tons/Hr
		Material:	Mild steel
		Drive:	3.7 kW x 4P geared motor
53110	Belt Conveyor	Quantity:	One (1)
		Service:	Lime stone transfer
		Capacity:	1.3 Tons/Hr
		Drive:	2.2 kW x 4P geared motor
53111	Belt Conveyor	Quantity:	One (1)
		Service:	Crushed lime stone transfer
		Capacity:	1.3 Tons/Hr
		Material:	Mild steel
		Drive:	0.75 kW x 4P geared motor
53112	Screw Conveyor	Quantity:	One (1)
		Service:	Crushed lime stone feeder
		Capacity:	1.3 Tons/Hr
		Drive:	1.5 kW

52113 Flight Conveyor

Quantity: One (1)
Service: Quick lime transfer
Capacity: 2 Tons/Hr
Material: Mild steel
Drive: 2.2 kW x 4P geared motor

53114 Screw Conveyor

Quantity: One (1)
Service: Quick lime transfer
Capacity: 2 Tons/Hr
Material: Mild steel
Drive: 2.2 kW x 4P geared motor

53115 Bucket Elevator

Quantity: One (1)
Service: Quick lime transfer
Capacity: 2 Tons/Hr
Material: Mild steel
Drive: 2.2 kW x 4P geared motor

53116 Bucket Elevator

Quantity: One (1)
Service: Crushed lime stone
Capacity: 1.3 Tons/Hr
Drive: 1.5 kW x 4P

53201 Circulation Pump

Quantity: One (1)
Service: Lime mud
Capacity: 0.5 m³/min. x 20 m Head
Material: SCS 14
Drive: 5.5 kW x 4P

53202 Transfer Pump

Quantity: One (1)
Service: Lime mud 2% slurry
Capacity: 0.3 m³ x 15 m Head
Material: SCS 14
Drive: 2.2 kW x 4P

- 53401 Silo
- Quantity: One (1)
Service: Crushed lime stone storage
Capacity: 35 m³
Main Size: 2,800 mm ϕ x 5,700 mm Height
Material: Mild steel
- 53402 Silo
- Quantity: One (1)
Service: Quick lime storage
Main Size: 4,200 mm ϕ x 5,300 mm Height
Material: Mild steel
- 53601 Scaffolding and Steel Structure
- Quantity: One (1) set
Material: Mild steel
- 53701 Pipes, Valves and Fittings
- One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 56. ELECTROLYSIS

56000 Design Basis

1) Chlorine

Capacity:

10,000 kg/D as 100% Chlorine gas
Excess chlorine to be lignidized.

2) Caustic Soda

Capacity:

9,000 kg/D as 100% Caustic soda

Concentration:

12%

1. Salt Purification

56101 Portable Conveyor

Quantity: One (1)
Service: Raw Salt
Type: Belt Conveyor
Size: 400 mmW x 10,000 mmL
Material: Mild Steel
Drive: 1.5 kW x 4P x 1/15 geared motor

56102 Settler

Quantity: One (1)
Type: Vertical Thickener
Size: 4,450 mm ϕ x 3,000 mmH
Material: Mild steel with hard rubber lining
Drive: 0.75 kW x 4P motor

56103 Mud Filter

Quantity: One (1)
Type: Press Filter Type
Capacity: 3 m³/Hr
Material:
Body; Cast iron with hard rubber lining
Chamber and Plate; FRP

56104 Brine Filter

Quantity: Two (2), One (1) for stand-by
Type: Vertical & Cylindrical
Capacity: 8 m³/Hr
Material: Cast iron with hard rubber lining

56201 Salt Solution Pump

Quantity: Two (2), One (1) for stand-by
Service: Salt solution receiver tank discharge
Type: Centrifugal
Capacity: 8 m³/Hr x 15 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 1.5 kW x 4P motor

56202 Caustic Soda Pump

Quantity: Two (2), One (1) for stand-by
Service: Caustic tank discharge
Type: Centrifugal
Capacity: 0.4 m³/Hr x 10 m Head
Material:
Impeller; Cast iron
Casing; Cast iron
Drive: 0.4 kW x 4P motor

56203 Sodium Carbonate Pump

Quantity: Two (2), One (1) for stand-by
Service: Na₂CO₃ tank discharge
Type: Centrifugal
Capacity: 0.4 m³/Hr x 10 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 0.4 kW x 4P motor

56204 Chemicals Pump

Quantity: Two (2), One (1) for stand-by
Service: Chemical tank discharge
Type: Centrifugal
Capacity: 0.4 m³/Hr x 10 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 2.2 kW x 4P motor

56205 Slurry Pump

Quantity: Two (2), One (1) for stand-by
Service: Slurry receiver tank discharge
Type: Centrifugal
Capacity: 3 m³/Hr x 15 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 1.5 kW x 4P motor

56206 Filtrate Pump

Quantity: Two (2), One (1) for stand-by
Service: Filtrate receiver tank discharge
Type: Centrifugal
Capacity: 3 m³/Hr x 15 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 1.5 kW x 4P motor

56207 Waste Washing Water Pump

Quantity: Two (2), One (1) for stand-by
Service: Waste washing water tank discharge
Type: Centrifugal
Capacity: 12 m³/Hr x 15 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 1.5 kW x 4P motor

56208 Filter Washing Pump

Quantity: Two (2), One (1) for stand-by
Service: Brine receiver tank discharge
Type: Centrifugal
Capacity: 60 m³/Hr x 15 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 5.5 kW x 4P motor

56209 Brine Pump

Quantity: Two (2), One (1) for stand-by
Service: Brine receiver tank discharge
Type: Centrifugal
Capacity: 8 m³/Hr x 15 m Head
Material:
Impeller; Cast iron with hard rubber lining
Casing; Cast iron with hard rubber lining
Drive: 1.5 kW x 4P motor

- 56210 **HCL Pump**
- Quantity: Two (2), One (1) for stand-by
 Service: HCL measuring tank discharge
 Type: Diaphragm
 Capacity: 20 l/Hr x 5 kg/cm² G
 Material:
 Diaphragm: Teflon
 Casing: PVC
 Drive: 0.2 kW x 4P motor
- 56211 **Purified Brine Feed Pump**
- Quantity: Two (2), One (1) for stand-by
 Service: Purified brine tank discharge
 Type: Centrifugal
 Capacity: 8 m³/Hr x 15 m Head
 Material:
 Impeller: Cast iron with hard rubber lining
 Casing: Cast iron with hard rubber lining
 Drive: 1.5 kW x 4P motor
- 56212 **Purified Brine Feed Pump**
- Quantity: Two (2), One (1) for stand-by
 Service: Purified brine tank discharge
 Type: Centrifugal
 Capacity: 1 m³/Hr x 15 m Head
 Material:
 Impeller: Cast iron with hard rubber lining
 Casing: Cast iron with hard rubber lining
 Drive: 1.5 kW x 4P motor
- 56401 **Salt Dissolver**
- Quantity: Two (2)
 Volume: 15 m³
 Main Dimension: 2,800 mm ϕ x 4,000 mm Height
 Material: Mild steel with hard rubber lining
- 56402 **Salt Solution Receiver Tank**
- Quantity: One (1)
 Volume: 2 m³
 Main Dimension: 1,400 mm ϕ x 1,500 mm Height
 Material: Mild steel with hard rubber lining

56403	Caustic Solution Tank	One (1)	0.4 m ³	840 mm ϕ x 900 mm Height	Mild steel
56404	Sodium Carbonate Tank	Two (2)	0.4 m ³	840 mm ϕ x 900 mm Height	Mild steel with hard rubber lining
56405	Chemicals Tank	Two (2)	1.5 m ³	1,300 mm ϕ x 1,700 mm Height	Mild steel with hard rubber lining
56406	Reactor	One (1)	5 m ³	1,700 mm ϕ x 2,400 mm Height	Mild steel with hard rubber lining
	Accessories:	One (1) agitator			
	Drive:	2.2 kW x 4P motor			
56407	Slurry Receiver Tank	One (1)	2 m ³	1,400 mm ϕ x 1,500 mm Height	Mild steel with hard rubber lining
56408	Filtrate Receiver Tank	One (1)	3 m ³	1,450 mm ϕ x 2,000 mm Height	Mild steel with hard rubber lining

56409	Waste Washing Water Tank	<p>Quantity: One (1)</p> <p>Volume: 10 m³</p> <p>Main Dimension: 2,750 mmϕ x 1,800 mm Height</p> <p>Material: Mild steel with hard rubber lining</p>
56410	Brine Receiver Tank	<p>Quantity: One (1)</p> <p>Volume: 10 m³</p> <p>Main Dimension: 2,750 mmϕ x 1,800 mm Height</p> <p>Material: Mild steel with hard rubber lining</p>
56411	Brine Head Tank	<p>Quantity: One (1)</p> <p>Volume: 3 m³</p> <p>Main Dimension: 1,450 mmϕ x 2,000 mmH</p> <p>Material: Mild steel with hard rubber lining</p> <p>Accessories: One (1) agitator</p> <p>Drive: 1.5 kW x 4P motor</p>
56412	HCL Measuring Tank	<p>Quantity: One (1)</p> <p>Volume: 3 m³</p> <p>Main Dimension: 1,450 mmϕ x 2,000 mm Height</p> <p>Material: Mild steel with hard rubber lining</p>
56413	Purified Brine Tank	<p>Quantity: One (1)</p> <p>Volume: 30 m³</p> <p>Main Dimension: 3,500 mmϕ x 3,500 mm Height</p> <p>Material: Mild steel with hard rubber lining</p>

2. NaOH Electrolyzer

56121 Rectifier

Quantity: Three (3)
Type: Thyrist former
Capacity: 600 KVA

56122 Electrolyzer

Quantity: Three (3)
Type: Ion Exchange Membrane Cell
Capacity: 53 Cells each set
Material: Mild steel with hard rubber lining

56123 Transformer

Quantity: Three (3)
Type: Indoor
Capacity: 3,000 V – 300 A
Material: Mild steel

56124 Washing Tower Cooler

Quantity: One (1)
Type: Plate type
Capacity: 12 m³/Hr
Material: All surface in contact with liquid to be made of stainless steel

56125 Hydrogen Gas Fan

Quantity: Two (2), One (1) for stand-by
Type: Turbo fan
Capacity: 130 Nm³/Hr x 400 mm Aq.
Material: Mild steel
Drive: 1.5 kW x 4P motor, V-belt drive

56126 Washing Tower Cooler

Quantity: One (1)
Type: Plate type
Capacity: 10 m³/Hr
Material: Plate; Titanium
Frame; Mild steel

- 56127 **Chlorine Gas Blower**
- Quantity: Two (2), One (1) for stand-by
 Type: Turbo fan
 Capacity: 130 Nm³/Hr x 400 mm Aq
 Material: FRP
 Drive: 1.5 kW x 4P motor, V-belt drive
- 56128 **Pure Water Unit**
- Quantity: One (1)
 Type: Ion exchange type
 Capacity: 5 m³/Hr
 Material: Mild steel with hard rubber lining
- 56129 **Dechlorination Air Blower**
- Quantity: Two (2), One (1) for stand-by
 Type: Roots
 Capacity: 160 Nm³/Hr x 0.5 kg/cm²G
 Material: Mild steel and Cast iron
 Drive: 3.7 kW x 4P motor, V-belt drive
- 56130 **NaOH Dilute Mixer**
- Quantity: One (1)
 Type: Inline, static type
 Capacity: 4.5 m³/Hr
 Material: Stainless steel
- 56221 **Washing Water Pump**
- Quantity: Two (2), One (1) for stand-by
 Type: Centrifugal
 Capacity: 12 m³/Hr x 15 m Head
 Material:
 Impeller; Cast iron with hard rubber lining
 Casing; Cast iron with hard rubber lining
 Drive: 2.2 kW x 4P motor
- 56222 **Chlorinated Water Pump**
- Quantity: Two (2), One (1) for stand-by
 Type: Centrifugal
 Capacity: 5 m³/Hr x 15 m Head

	Material:	
	Impeller;	Cast iron with hard rubber lining
	Casing;	Cast iron with hard rubber lining
	Drive:	1.5 kW x 4P motor
56233	Washing Tower Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	10 m ³ /Hr x 15 m Head
	Material:	
	Impeller;	Cast iron with hard rubber lining
	Casing;	Cast iron with hard rubber lining
	Drive:	2.2 kW x 4P motor
56224	Treated Brine Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	5.5 m ³ /Hr x 15 m Head
	Material:	
	Impeller;	Titanium
	Casing;	Titanium
	Drive:	1.5 kW x 4P motor
56225	Caustic Solution Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	4.5 m ³ /Hr x 30 m Head
	Material:	
	Impeller;	Cast iron
	Casing;	Cast iron
	Drive:	3.7 kW x 4P motor
56226	Pure Water Pump	
	Quantity:	One (1)
	Type:	Centrifugal
	Capacity:	5 m ³ /Hr x 15 m Head
	Material:	
	Impeller;	Stainless steel castings
	Casing;	Stainless steel castings
	Drive:	1.5 kW x 4P motor

56227	Dilute NaOH Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	8.5 m ³ /Hr x 30 m Head
	Material:	
	Impeller;	Cast iron
	Casing;	Cast iron
	Drive:	3.7 kW x 4P motor
56421	Hydrogen Gas Separator	
	Quantity:	One (1)
	Capacity:	130 Nm ³ /Hr
	Material:	Mild steel with hard rubber lining
56422	Hydrogen Gas Wasing Tower	
	Quantity:	One (1)
	Capacity:	130 Nm ³ /Hr
	Material:	Mild steel
56423	Hydrogen Condensate Receiver	
	Quantity:	One (1)
	Volume:	0.5 m ³
	Main Dimension:	800 mm ϕ x 1,200 mm Height
	Material:	Mild steel
56424	Hydrogen Gas Safety Tank	
	Quantity:	One (1)
	Volume:	0.25 m ³
	Main Dimension:	600 mm ϕ x 1,000 mm Height
	Material:	Mild steel
56425	Chlorine Gas Separator	
	Quantity:	One (1)
	Capacity:	130 Nm ³ /Hr
	Material:	FRP

56426	Chlorine Gas Washing Tower	
	Quantity:	One (1)
	Capacity:	130 Nm ³ /Hr
	Material:	
	Body;	FRP
	Internals;	PVC
56247	Chlorinated Water Receiving Tank	
	Quantity:	One (1)
	Volume:	1 m ³
	Main Dimension:	1,000 mm ϕ x 1,400 mm Height
	Material:	FRP
56428	Dechlorination Tower	
	Quantity:	One (1)
	Capacity:	5.5 m ³ /Hr
	Material:	
	Body;	FRP
	Internals;	PVC
56429	Brine Aeration Tank	
	Quantity:	One (1)
	Volume:	8 m ³
	Main Dimension:	2,000 mmW x 2,000 mmL x 2,200 mmH
	Material:	Mild steel with hard rubber lining
56430	Caustic Solution Tank	
	Quantity:	One (1)
	Volume:	50 m ³
	Main Dimension:	3,200 mm ϕ x 6,850 mm Height
	Material:	Mild steel
56431	Dilute Caustic Solution Tank	
	Quantity:	One (1)
	Volume:	34 m ³
	Main Dimension:	3,200 mm ϕ x 4,650 mm Height
	Material:	Mild steel

DEPARTMENT 57. BLEACH CHEMICALS PREPARATION

57000 Design Basis

1) Chlorine

Liquidizing Capacity: 4,000 kg/D as 100% Chlorine

2) Sodium Hypochlorite

Capacity: 2,000 kg/D as available Chlorine

Concentration: 35 g/L as available Chlorine

1. Chlorine Liquefaction

57101 No. 1 Chlorine Water Cooler

Quantity: One (1)
Type: Plate type
Capacity: 12 m³/Hr
Material:
Plate; Titanium
Frame; Mild steel

57102 Chlorine Gas Booster Blower

Quantity: Two (2), One (1) for stand-by
Type: Centrifugal
Capacity: 300 Nm³/Hr
Material: Ceramic
Drive: 15 kW x 4P motor

57103 No. 2 Chlorine Water Cooler

Quantity: One (1)
Type: Plate
Capacity: 4 m³/Hr
Material:
Plate; Titanium
Frame; Mild steel

57104 No. 1 Sulphuric Acid Cooler

Quantity: One (1)
Type: Plate
Capacity: 4 m³/Hr
Material:
Plate; Alloy
Frame; Mild steel

57105 No. 2 Sulphuric Acid Cooler

Quantity: One (1)
Type: Plate
Capacity: 4 m³/Hr
Material:
Plate; Alloy
Frame; Mild steel

57106	Refrigeration Unit	
	Quantity:	One (1)
	Type:	Two-stage compressor
	Material:	Mild steel and Cast iron
	Drive:	One (1) – 4.5 kW motor, V-belt drive One (1) – 2.2 kW motor, V-belt drive
57107	Cl₂ Gas Condenser	
	Quantity:	One (1)
	Type:	Shell and Tube type
	Capacity:	170 kg/Hr
	Material:	Mild steel
57108	Hoist	
	Quantity:	One (1)
	Type:	Motor trolley
	Capacity:	2 tons
	Material:	Mild steel and Cast iron
	Drive:	
	Lifting;	3.7 kW x 4P motor
	Travelling;	0.5 kW x 4P motor
57201	Feed Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	1.5 m ³ /Hr x 11 m Head
	Material:	
	Impeller;	Cast iron with plastic lining
	Casing;	Cast iron with plastic lining
	Drive:	0.75 kW x 4P motor
57202	No. 1 Chlorine Water Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	12 m ³ /Hr x 13 m Head
	Material:	
	Impeller;	Cast iron with plastic lining
	Casing;	Cast iron with plastic lining
	Drive:	2.2 kW x 4P motor

57203	No. 2 Chlorine Water Pump	<p>Quantity: Two (2), One (1) for stand-by Type: Centrifugal Capacity: 4 m³/Hr x 15 m Head Material: Impeller; Cast iron with plastic lining Casing; Cast iron with plastic lining Drive: 1.5 kW x 4P motor</p>
57204	No. 1 Sulphuric Acid Pump	<p>Quantity: Two (2), One (1) for stand-by Type: Centrifugal Capacity: 4 m³/Hr x 15 m Head Material: Impeller; Cast iron with plastic lining Casing; Cast iron with plastic lining Drive: 1.5 kW x 4P motor</p>
57205	No. 2 Sulphuric Acid Pump	<p>Quantity: Two (2), One (1) for stand-by Type: Centrifugal Capacity: 4 m³/Hr x 15 m Head Material: Impeller; Cast iron with plastic lining Casing; Cast iron with plastic lining Drive: 1.5 kW x 4P motor</p>
57206	No. 3 Sulphuric Acid Pump	<p>Quantity: Two (2), One (1) for stand-by Type: Centrifugal Capacity: 4 m³/Hr x 15 m Head Material: Impeller; Cast iron with plastic lining Casing; Cast iron with plastic lining Drive: 1.5 kW x 4P motor</p>
57207	No. 4 Sulphuric Acid Pump	<p>Quantity: Two (2), One (1) for stand-by Type: Centrifugal Capacity: 4 m³/Hr x 15 m Head</p>

	Material:	
	Impeller;	Cast iron with plastic lining
	Casing;	Cast iron with plastic lining.
	Drive:	1.5 kW x 4P motor
57208	Liquid Chlorine Pump	
	Quantity:	Two (2), One (1) for stand-by
	Type:	Centrifugal
	Capacity:	11 m ³ /Hr x 45 m Head
	Material:	
	Impeller;	Stainless steel castings (SUS 304)
	Casing;	Stainless steel castings (SUS 304)
	Drive:	11 kW x 4P motor
57401	Sulphuric Acid Storage Tank	
	Quantity:	One (1)
	Volume:	2 m ³
	Main Dimension:	1,400 mm ϕ x 1,500 mm Height
	Material:	Mild steel
57402	No. 1 Cooling Tower	
	Quantity:	One (1)
	Capacity:	410 kg/Hr
	Material:	PVC
57403	No. 2 Cooling Tower	
	Quantity:	One (1)
	Volume:	410 kg/Hr
	Material:	PVC
57404	Mist Separator	
	Quantity:	One (1)
	Main Dimension:	500 mm ϕ x 3,000 mm Height
	Material:	FRP & PVC
57405	Waste Sulphuric Acid Tank	
	Quantity:	One (1)
	Volume:	1 m ³
	Main Dimension:	1,090 mm ϕ x 1,150 mm Height
	Material:	Polyethylene

57406	No. 1 Drying Tower	
	Quantity:	One (1)
	Capacity:	320 kg/Hr
	Material:	PVC
57407	No. 2 Drying Tower	
	Quantity:	One (1)
	Capacity:	320 kg/Hr
	Material:	PVC
57408	No. 3 Drying Tower	
	Quantity:	One (1)
	Capacity:	320 kg/Hr
	Material:	PVC
57409	No. 4 Drying Tower	
	Quantity:	One (1)
	Capacity:	320 kg/Hr
	Material:	PVC
57410	Sulphuric Acid Mist Separator	
	Quantity:	One (1)
	Main Dimension:	550 mmϕ x 3,000 mm Height
	Material:	Mild steel
57411	Liquid Chlorine Receiver	
	Quantity:	One (1)
	Capacity:	15 tons
	Main Dimension:	1,900 mmϕ x 4,760 mm Length
	Material:	Mild steel

2. Na-Hypo Preparation

57121 Circulating Cooler

Quantity: One (1)
Type: Plate type
Capacity: 16 m³/Hr
Material:
Plate; Titanium
Frame; Mild steel

57122 Blower

Quantity: One (1)
Type: Turbo
Capacity: 15 m³/min. x 300 mm Aq.
Material: FRP
Drive: 3.7 kW x 4P motor

57221 Hypo Tower Circulating Pump

Quantity: Two (2), One (1) for stand-by
Type: Centrifugal
Capacity: 16 m³/Hr x 15 m Head
Material:
Impeller; FRP
Casing; FRP
Drive: 3.7 kW x 4P motor

57222 Scrubber Circulating Pump

Quantity: Two (2), One (1) for stand-by
Type: Centrifugal
Capacity: 16 m³/Hr x 15 m Head
Material:
Impeller; FRP
Casing; FRP
Drive: 3.7 kW x 4P motor

57223	Na-Hypo Pump	<p>Quantity: Two (2), One (1) for stand-by Type: Centrifugal Capacity: 3 m³/Hr x 30 m Head Material: Impeller; FRP Casing; FRP Drive: 2.2 kW x 4P motor</p>
57421	Na-Hypo Tower	<p>Quantity: One (1) Volume: 80 kg/Hr (as available chlorine) Material: Mild steel with hard rubber lining and FRP</p>
57422	Vent Gas Scrubber	<p>Quantity: One (1) Volume: 250 kg/Hr as chlorine Material: Mild steel with hard rubber lining and FRP</p>
57423	Na-Hypo Storage Tank	<p>Quantity: One (1) Volume: 20 m³ Main Dimension: 2,800 mmϕ x 3,600 mm Height Material: FRP</p>

DEPARTMENT 61. FUEL SUPPLY

61000 Design Basis

Natural Gas Total Consumption: 3,720 Nm³/Hr
Supplied Gas Pressure: 42 kg/cm²G
Reduced Pressure: 4 kg/cm²

61101 Pressure Reduction Unit

Quantity: One (1)

DEPARTMENT 62. POWER PLANT

62000

Design Basis

- 1) Electric Power Generation: 5,000 kW
- 2) Process Steam from Turbine Extractions

Medium Pressure: 11 kg/cm²G at receiver
13.5–22.5 Tons/Hr

Low Pressure: 3.5 kg/cm²G at receiver
2.0 Tons/Hr
- 3) Steam Condensate from Process: 4.5 Tons/Hr at 80°C
- 4) Fuel Carotific Value: Natural Gas
3,700 Kcal/Nm³ at LCV

1. Steam Generation

62101 Power Boiler

Quantity: One (1) set
Consisting of: Furnace, Superheater, Gas Air Heater and Refractories

62102 Combustion Equipment

Quantity: One (1) set

62103 Forced Draft Fan

Quantity: One (1)

62104 Water Treating Equipment

Quantity: One (1) set
Consisting of: Sampling equipment and chemical dosing equipment

62105 Demineralizing System

Quantity: One (1) set
Capacity: 20 Tons/Hr

62106 Deaerator

Quantity: One (1) set

62107 Induced Draft Fan

Quantity: One (1)

62201 Boiler Feed Water Pump

Quantity: Two (2)

62202 Deaerator Feed Pump

Quantity: Two (2)

62401 Feed Water Tank
 Quantity: One (1) set
 Material: Mild steel

62601 Scaffolding and Steel Structure
 Quantity: One (1) set
 Material: Mild steel

62701 Pipes, Valves and Fittings
 One (1) set of pipes, valves and fittings for this department will be supplied.

2. Power Generation

62121	Turbine	
	Quantity:	One (1)
62122	Ejector	
	Quantity:	One (1)
62123	Condenser	
	Quantity:	One (1)
62124	Generator	
	Quantity	One (1)
62125	Excitation System	
	Quantity:	One (1)
	Consist of:	Exciter and Automatic Voltage Regulator
62126	Diesel Engine Generator	
	Quantity:	One (1)
	Service:	For start-up and emergency
	Accessories:	Fuel oil tank and cooling water tank

DEPARTMENT 65. ELECTRICAL EQUIPMENT

65100 Electrical Equipment for Power Distribution System

65101 Supervisory panel for Turbine-Generator

Quantity: One (1) set
Type: Indoor-use metal enclosed vertical self standing type

- Consisting of:
- 1 set - Frequency meter
 - 1 set - A.C. voltmeter
 - 1 set - A.C. ammeter
 - 1 set - Power factor meter
 - 1 set - Indicating wattmeter
 - 1 set - Watthour meter
 - 1 set - AVR
 - 1 set - Control switch
 - 1 set - Other necessities.

65102 Supervisory Panel for Feeder

Quantity: One (1) set
Type: Indoor-use metal enclosed vertical self standing type

- Consisting of:
- 1 set - A.C. ammeter
 - 1 set - Watt hourmeter
 - 1 set - Control switch
 - 1 set - Other necessities

65103 Main Feeder Switchgear

Main feeder switchgear will be used for the secondary side of the turbine generator to distribute the electric power to each department.

Quantity: One (1) set
Type: Indoor-use metal enclosed vertical self standing type

Consisting of:

- 1 set - High voltage circuit breaker
- 1 set - Current transformer
- 1 set - Potential transformer
- 1 set - Other necessities

65200 Electrical Equipment for Each Dept.

65201 High Voltage Switchgear

High voltage switchgears are provided for the primary side of high voltage transformers and the starter of high voltage motors.

Quantity: One (1) set
Type: Indoor-use, metal enclosed vertical self standing type

Consisting of:

- 1 set - A.C. ammeter
- 1 set - Watthour meter
- 1 set - Current limiting power fuse
- 1 set - Magnetic contactor
- 1 set - Protection relay
- 1 set - Other necessities

65202 High Voltage Transformer

High voltage transformer will be used for transforming electric power from 3,000 V to 400 V.

Quantity: One (1) set
Type: Indoor-use, three phase oil immersed self cooled type
Frequency: 50 Hz
Rated Voltage: 3,000 V/400 V

65203 Load Center

Load centers are provided for the secondary side of high voltage transformer to distribute low voltage electric power.

Quantity: One (1) set
Type: Indoor-use, metal enclosed vertical self standing type

Consisting of:

- 1 set - Molded case circuit breaker
- 1 set - A.C. voltmeter

65204 Low Voltage Combination Motor Starter

Low voltage combination motor starter will be used for the low voltage motor starting and switching of low voltage equipment.

Quantity: **One (1) set**

Type: **Indoor-use, metal enclosed vertical self-standing control center type**

Consisting of:

- 1 set - Molded case circuit breaker
- 1 set - Magnetic contactor
- 1 set - Thermal relay
- 1 set - Pilot lamp
- 1 set - Push button switch
- 1 set - Other necessities

65205 Local Push Button Switch Box

Quantity: **One (1) set**

Type: **Sheet steel wall mount box type**

Consisting of:

- 1 set - Pilot lamp
- 1 set - Push button switch
- 1 set - Change over switch (if necessary)
- 1 set - A.C. ammeter (if necessary)

65206 Electrical Motors

- 1) Specification for low voltage motor

Motors rated 75 kW and below will be low voltage squirrel cage motor.

a) Standards

All equipment shall be designed and manufactured in accordance with applicable current JEC, JEM and JIS.

Low voltage power system

- Nominal system voltage: **400 V**
- Phase: **3**

Frequency: 50 Hz
Rated motor voltage: 400 V

b) Enclosure

All continuous rating motors will be totally enclosed fan cooled type, and totally enclosed type for short time rating motor.

c) Frames

All motor shall be built in JEM standard frames.

d) Insulation

The insulation system shall be JEC class E and Class F.

2) Specification for High voltage motor

Motors rated 75 kW above will be high voltage squirrel cage motor or wound rotor type motor.

a) Standards

All equipment shall be designed and manufactured in accordance with applicable current JEC, JEM and JIS.

High voltage power system

Nominal system voltage: 3,000 V
Phase: 3
Frequency: 50 Hz
Rated motor voltage: 3,000 V

b) Frames

All motor shall be built in JEM standard frames.

c) Insulation

The insulation system shall be JEC class F.

d) Rating

Continuous rating without service factor.

e) Enclosure

All motors will be drip-proof type for indoor use or totally enclosed fan cooled type for outdoor use.

3) Specification for eddy current coupling motor (EC motor)

The eddy current coupling motor will be used for the machine to control the speed.

a) Frames, rating, temperature rise and enclosure will be applied in accordance with above item 1) and 2).
Insulation class of EC coupling will be JEC class B.

b) Coupling cooling system

Coupling for low voltage motors will be applied the natural air cooling system.

c) Speed control

10 : 1 (Continuous rating)
±1% (Accuracy)

65300 Electrical Equipment for Pulp M/C and Dryer

The pulp M/C will be driven and controlled by EC motor and pulp dryer will be driven and controlled by D.C. motor.

65301 D.C. Motor

Quantity: One (1) set
Type: Separately – excited
shunt-wound fan mount type
Rating: D.C. 440 V continuous
Insulation: JEC class F

65302 D.C. Motor Control Panel

Quantity: One (1) set
Type: Indoor-use, metal enclosed
vertical self standing type

Consisting of:

- 1 set - D.C. ammeter
- 1 set - Magnetic contactor
- 1 set - Thyrister control unit
- 1 set - Speed control unit
- 1 set - Other necessaries

65303 Dryer Operation Panel

Quantity:

One (1) set

Type:

Indoor-use metal enclosed
wallmount or pole stand type

Consisting of:

- 1 set - Push button switch
- 1 set - Speed meter
- 1 set - Tension meter
- 1 set - Other necessaries

65304 EC Motor

Quantity:

One (1) set

Type:

Please, refer to 65206-3)

65305 EC Motor Control Panel

Quantity:

One (1) set

Type:

Indoor-use, metal enclosed vertical
self standing type

Consisting of:

- 1 set - Molded case circuit breaker
- 1 set - EC motor control unit
- 1 set - Auxiliary relay
- 1 set - Other necessaries

65306 Pulp M/C Operation Panel

Quantity:

One (1) set

Type:

Indoor-use, metal enclosed desk type

Consisting of:

- 1 set - Push button switch
- 1 set - Pilot lamp
- 1 set - Speed setter

- 1 set - Speed meter
- 1 set - A.C. ammeter
- 1 set - Other necessities

65400 Electrical Equipment for Lighting and Instrumentation

65401 Transformer for Lighting and Instrumentation

- Quantity: One (1) set
- Type: Indoor-use, oil immersed self cooled type
- Frequency: 50 Hz
- Rated Voltage: 3,000 V/200, 100.V

65402 Distribution Panel for Lighting and Instrumentation

- Quantity: One (1) set
- Type: Indoor-use, metal enclosed vertical self standing type

Consisting of:

- 1 set - Molded case circuit breaker
- 1 set - A.C. voltmeter
- 1 set - Other necessities

65403 Lighting Switch Box and Lighting Apparatus

- Quantity: One (1) set
- Type: Mercury light and fluorescent light

65700 Electric Wiring Piping

All materials, designing, wiring piping works shall be in accordance with JIS, JEC, JEM, JCS and Ministerial Technical Ordinance for Electric Facilities.

Main wiring route will be cable rack on duct and branch route will be thick steel conduit pipe.

The main materials for electric wiring, piping will be as follows:

1) Cables and Wire

- 3.3 KV CV Cable
- 600 V CV Cable
- 600 V CVV Cable

600 V CVVS Cable
600 V IV Wire

- 2) Cable rack
- 3) Cable duct
- 4) Thick steel conduit pipe
- 5) Flexible conduit pipe
- 6) Each size of termination
- 7) Pull box
- 8) Grounding materials
- 9) Others

Where **CV:** Cross-linked, polyethylene, insulated polyvinyl chloride sheathed cable.

CVV: Polyvinyl chloride insulated & sheathed control cable.

CVV-S: Polyvinyl chloride insulated & sheathed control cable with shield assembly.

IV: Polyvinyl chloride insulated wire.

DEPARTMENT 66: INSTRUMENTATION

66000 Instrument

All necessary recorder, indicator and controller for pressure, temperature and flow are furnished to suit the requirement of automatic controlling operations of the process of the proposed mill.

- i) Almost of instruments, except direct reading one, are pneumatic type.
- ii) Control signal is $0.2 \text{ kg/cm}^2 - 1 \text{ kg/cm}^2$ pneumatic signal system and the control valves and damper actuator are of pneumatic driving type.
- iii) Air source and electric source for instruments:
 5.0 kg/cm^2 and above essential air and A.C: 100 V, 50 Hz, 1 phase.

66400 Instrument Panel

Quantity:

One (1) set

Service:

- Power boiler
- Incinerator
- Water supply & Effluent treatment
- Cooking & Washing
- Bleaching & Screening
- Pulp machine
- Black liquor evaporation
- Reausticizing
- Lime recovery

Type:

Sheet steel enclosure floor mounted self-standing cubicle type, indoor use

Each panel will be equipped with the instruments and controls and other necessities like air set, piping and wiring etc.

66500 Pneumatic Operation Equipment for Pulp Machine

Floor mounted operator's panel will contain all pneumatic operation equipment.

66700

Piping and Wiring Material for Instruments

Instrument wiring, piping and tubing works will be done in accordance with JIS, JEC, JEM, JCS and Ministerial Technical Ordinance for Electric Facilities.

The instrument pipes, tubes, cables from central control instrument panels to local instruments, sensors and actuators will be installed on instrument cable rack.

The major materials of piping and wiring will be as follows:

1) Cables

The cable main kind specifications will be as follows:

(1) Multi-conductor control cable

600 V
600 V

CVV cable
CVV-S cable (Sealed cable)

2) 600 V

IV Electric wire

3) Vinyl covered multi-control copper tube

JIS 6/4 ϕ

4) SGP (W) pipe

JIS 1B

JIS 1/2B

5) Thick steel conduit pipe

6) Others

DEPARTMENT 67. WATER SUPPLY

6701

67000

Design Basis:

(1) Capacity:

Treated Water for Process: 9,600 m³/D

Raw Water for Cooling Water: 18,000 m³/D

Drinking Water: 50 m³/D

(2) Raw Water Quality

As per attached sheet (Table 1)

(3) Treated Water:

Based on TAPPI standard

Quantity:

Turbidity as SiO ₂	25
Color as platinum units	5
Total hardness as CaCO ₃	100
Calcium hardness as CaCO ₃	50
Magnesium hardness as CaCO ₃	50
Alkalinity as CaCO ₃	75
Iron (Fe)	0.1
Manganese (Mn)	0.05
Silica (SiO ₂)	20
Dissolved Solids	250
Free carbon dioxide as CO ₂	10
Chloride (Cl)	75

Table 7-1. Meghna River Water Analysis

	pH	Turbidity PPM/NTU	Conduc- tivity US/cm	M. Alkali		T.T.		C.		Sodium PPM	Chloride PPM	Sulphate PPM	Silica PPM	Total Solid PPM	SS PPM
				PPM as CaCO ₃	PPM as CaCO ₃	Hardness PPM as CaCO ₃	Hardness PPM as CaCO ₃								
1980 Nov.	6.9-8.8	14-80	67-170	25-30	20-25	9-15									
Dec.	6.5-7.5	8-23	25-125	27-38	25-33	14-21									
1981 Jan.	6.5-7.5	6-8	28-48	32-40	8-27										
Feb.	6.9-8.3	3-9	98-118	41-55	41-46	26-28	0.4-3.9	2.3-8.0							
Mar.	7.0-8.3	3-23	120-140	48-56	36-56	19-30	2-4.6		7-19			4-6	80-125	9-37	
Apr.	6.8-7.8	6-72	70-150	25-52	24-29	15-29	2-4.4								
May	6.7-7.5	24-134	62-86	30	20-28	13-17	2.5-4.6		0.6-1.3				3.8-8.1		
Jun.	6.5-7.3	18-85	54-66	25	19-21	11-14	1.9-3.8						6.5-7.5		
Jul.	6.8-7.8	10-24	42-57	25	15-16	10-16	1.0-2.0		0.5-3.5				6.2-7.4		

67101	Raw Water Pond	Quantity: One (1) Type: Connected with river by concrete pipe Material: Concrete construction
67102	Clarifier	Quantity: One (1) Type: Rapid coagulation type Volume: 1,800 m ³ Material: Main Body; Reinforced concrete Mechanical Parts; Mild steel Auxiliaries: Chemical mixing pits on inlet side
67103	Clarified Water Pond	Quantity: One (1) Volume: 500 m ³ Material: Reinforced concrete
67104	Filter	Quantity: Two (2) Type: Sand filter, back wash type Capacity: 400 m ³ /Hr Material: Reinforced concrete construction
67105	Treated Water Pit	Quantity: One (1) Volume: 1,600 m ³ Material: Reinforced concrete construction
67106	Back Wash Blower	Quantity: One (1) Service: Back wash for Filter Capacity: 4 Nm ³ /min x 5,000 mm Aq. Drive: 7.5 kW motor

67107	Chemical Dosing Equipment	<p>Quantity: One (1) set</p> <p>Chemicals: Alum, Lime, and Coagulant</p> <p>Consist of: Dissolving tanks, agitators, and feeding pumps</p>
67108	Drinking Water Treatment	<p>Quantity: One (1) set</p> <p>Consist of: Filters, chlorinator, and pumps</p>
67201	Raw Water Pump	<p>Quantity: One (1)</p> <p>Service: Feed to clarifier</p> <p>Type: Centrifugal</p> <p>Capacity: 7.5 m³/min x 8 m Head each</p> <p>Material: Cast iron</p> <p>Drive: 22 kW x 4P</p>
67202	Raw Water Pump	<p>Quantity: One (1)</p> <p>Service: Feed to Turbine condenser and others</p> <p>Type: Centrifugal</p> <p>Capacity: 13 m³/min x 15 m Head each</p> <p>Material: Cast iron</p> <p>Drive: 75 kW x 4P</p>
67203	Clarified Water Pump	<p>Quantity: Two (2)</p> <p>Service: Feed to Filter</p> <p>Type: Centrifugal</p> <p>Capacity: 3.5 m³/min x 20 m Head</p> <p>Material: Cast iron</p> <p>Drive: 22 kW x 4P</p>
67204	Treated Water Pump	<p>Quantity: Three (3), one for stand-by</p> <p>Type: Centrifugal</p> <p>Capacity: 2 m³/min x 25 m Head</p> <p>Material: Cast iron</p> <p>Drive:</p>

67205 Treated Water Pump

Quantity: Two (2)
Service: For auxiliary use
Type: Centrifugal
Capacity: 0.5 m³/min x 25 m Head
Drive:

67206 Back Wash Pump

Quantity: One (1)
Service: Back wash for Filter
Type: Centrifugal
Capacity: 3.5 m³/min x 15 m Head
Material: Cast iron
Drive: 15 kw x 4P

67207 Sludge Pump

Quantity: One (1)
Type: Centrifugal
Capacity: 25 m³/Hr x 15 m Head
Material: Cast iron
Drive: 2.2 kW x 4P

67601 Scaffolding

Quantity: One (1) set
Material: Mild steel

67701 Pipes, Valves and Fittings

One (1) set of pipes, valves and fittings for this department will be supplied.

DEPARTMENT 68. COMPRESSED AIR SUPPLY

- 68101 Instrument Air Compressor
- Quantity: Three (3), one is stand-by
 Type: Water cooled, reciprocating, oil free
 Discharge Pressure: 7 kg/cm²G
 Capacity: 5.5 m³/min. at suction condition
 Speed: 550 rpm
 Cylinder Size: 250 mm ϕ
 Stroke: 180 mm
 Drive: 45 kW x 6P
 Accessories: One (1) receiver
 Two (2) after cooler
 Two (2) lubrication system
 Two (2) cooling system
 Two (2) protection system
 Two (2) suction filter with silencer
- 68102 Air Dryer
- Quantity: One (1)
 Type: Automatic, electric heating
 Capacity: 11 Nm³/min
 Dew Point: -20°C at 7 kg/cm²G
 Accessories: One (1) electric heater 10.8 kW
 One (1) blower 3.1 Nm³/min x 2,000 mm Aq
 One (1) prefilter
 One (1) after filter
- 68103 Mill Air Compressor
- Quantity: Two (2) one is stand-by
 Type: Oil free
 Discharge Pressure: 7 kg/cm²G
 Capacity: 11 m³/min at suction condition
 Speed: 550 rpm
 Cylinder Size: 250 mm ϕ x 2
 Stroke: 180 mm
 Drive: 90 kW x 6P
 Accessories: Two (2) receiver
 Two (2) after cooler
 Two (2) lubrication system
 Two (2) cooling system
 Two (2) protection system
 Two (2) suction filter

DEPARTMENT 69. OUTER PIPING

One (1) set of pipes, valves, fittings and supports for outer piping which connect between Pulp Mill and Water Supply, Pulp Mill and Fuel Supply, will be supplied.

DEPARTMENT 70. MILL SERVICE

The following equipment will be included in supply scope.

- 71. Maintenance Shop
- 72. Laboratory
- 73. Fire Protection
- 74. Vehicles
- 75. Communication Equipment
- 76. Office Equipment & Furniture
- 77. First Aid Equipment

DEPARTMENT 78. EFFLUENT TREATMENT

78000	Design Basis	
	Treatment Capacity:	9,600 m ³ /D
	Waste Water Quality:	
	pH;	9-10
	SS;	500 ppm
	BOD;	700 ppm
	Treated Water Quality:	
	pH;	6-8
	SS;	45 ppm
	BOD;	80 ppm
	Treatment Method:	Lagoon Type
78101	Waste Water Receiving Pit	
	Quantity:	One (1)
	Volume:	400 m ³
	Material:	Reinforced concrete
78102	Sedimentation Equipment	
	Quantity:	One (1)
	Volume:	
	Material:	Reinforced concrete
78103	Lagoon	
	Quantity:	One (1)
	Volume:	35,000 m ³
	Dimension:	50,000 mmW x 200,000 mmL x 3,500 mmD
78104	Aerator	
	Quantity:	Seventeen (17)
	Type:	Self Floating
	Diameter:	2,500 mmφ
	Drive:	11 kW x 4P

78201 Waste Water Transfer Pump

Quantity: One (1)
Service: Feed to Sedimentation
Type: Centrifugal
Capacity: 7.5 m³/min x 8 m Head
Material: Cast iron
Drive: 22 kW x 4P

72202 Sludge Pump

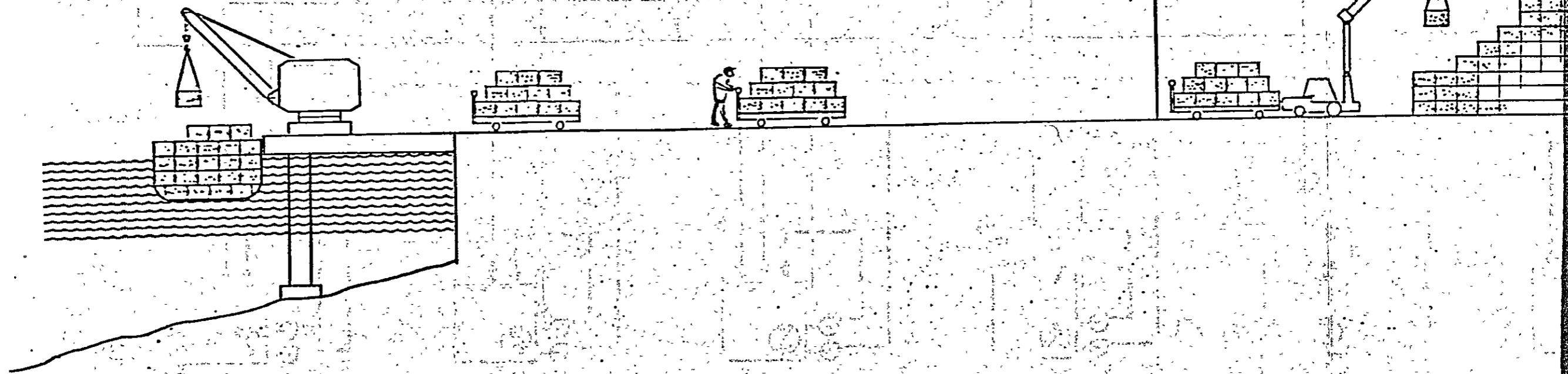
Quantity: One (1)
Type: Centrifugal
Capacity: 40 m³/Hr x 15 m Head
Material: Stainless steel
Drive: 3.7 kW x 4P

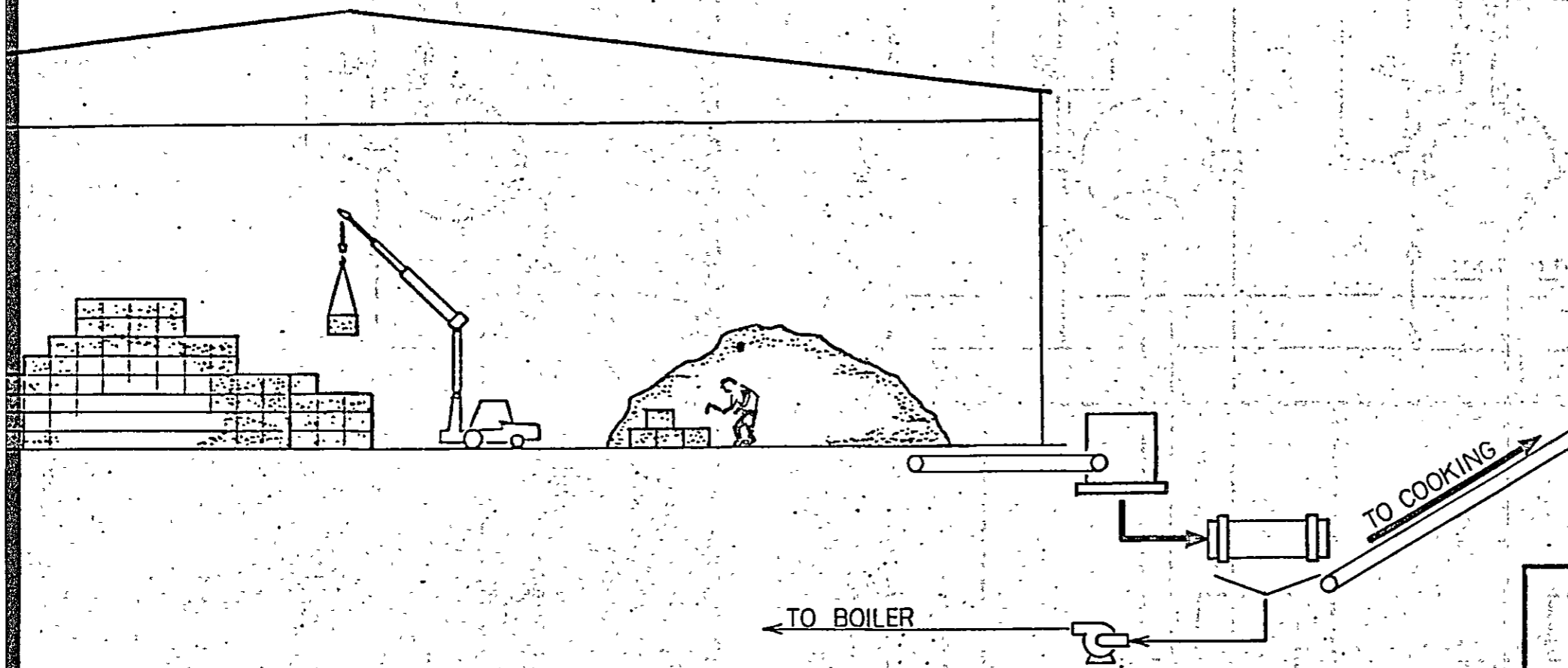
78601 Scaffolding

Quantity: One (1) set
Material: Mild steel

78701 Pipes, Valves, and Fittings

One (1) set of pipes, valves and fittings for this department will be supplied.

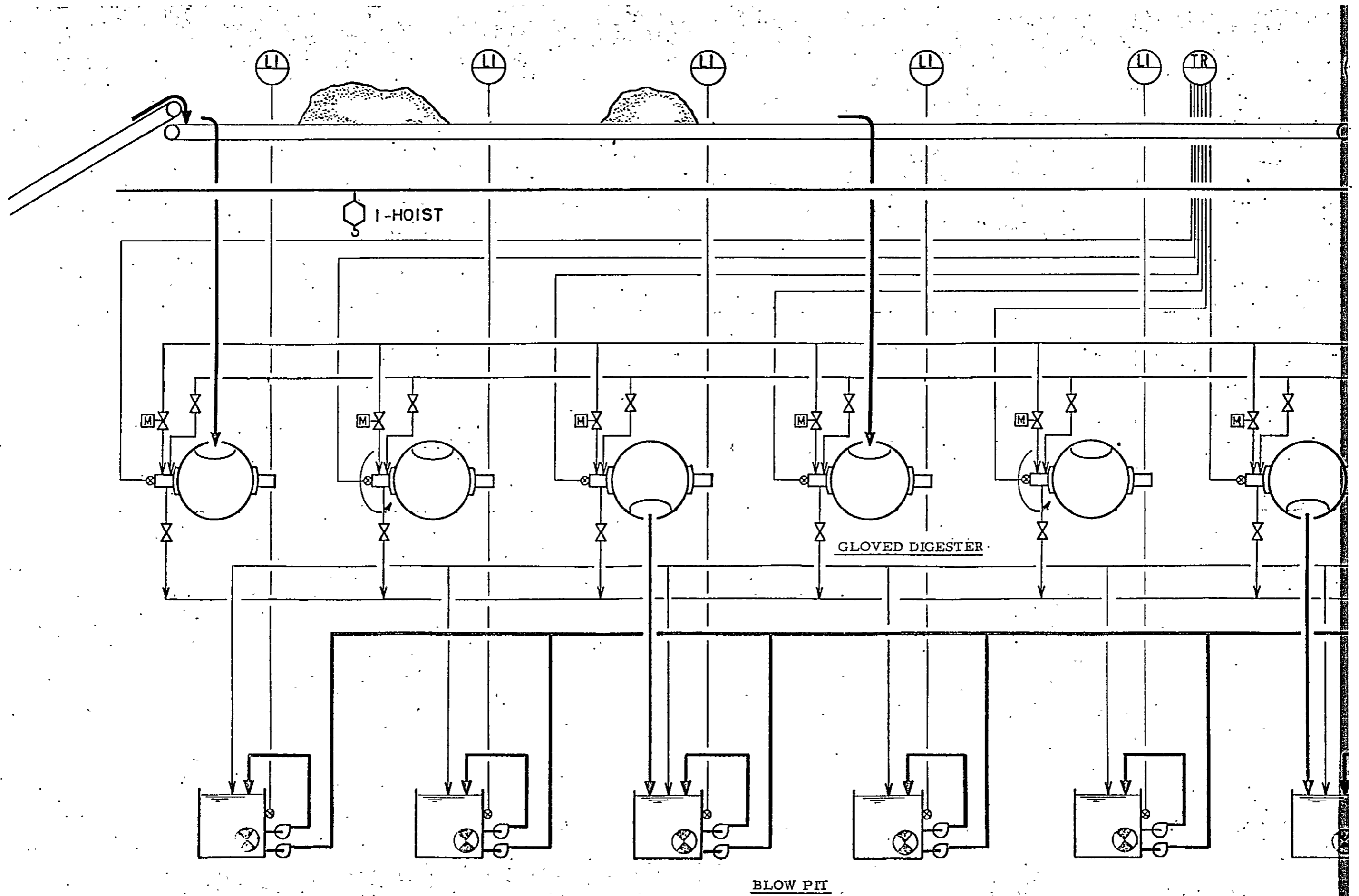




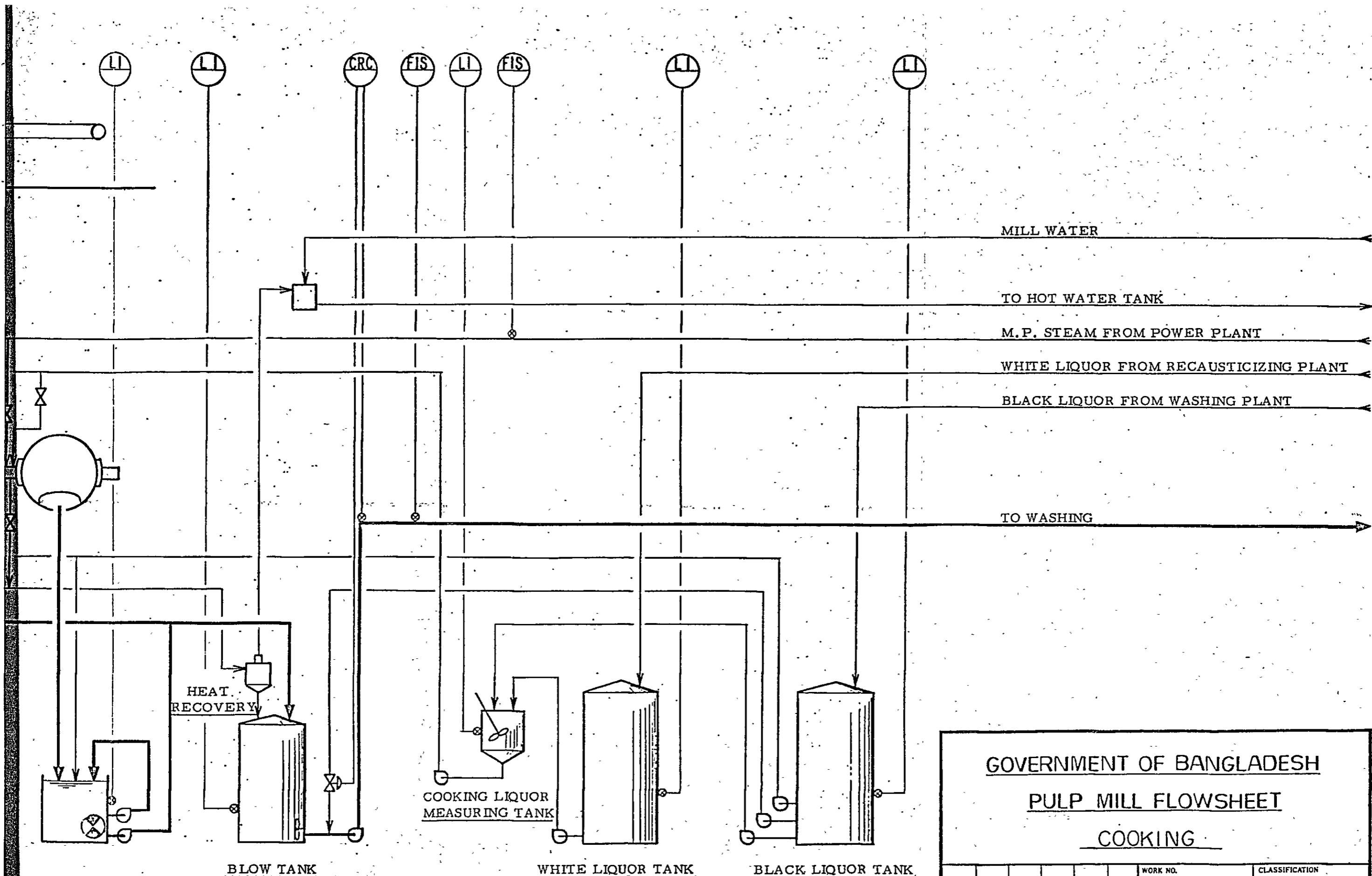
GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
RAW MATERIAL HANDLING

						WORK NO.	CLASSIFICATION
						DRAWING NO.	
DATE	DRAWN BY	ENG CHAS	CHIEF	DEPL MANAG	MANAG		

JAPAN INTERNATIONAL COOPERATION AGENCY

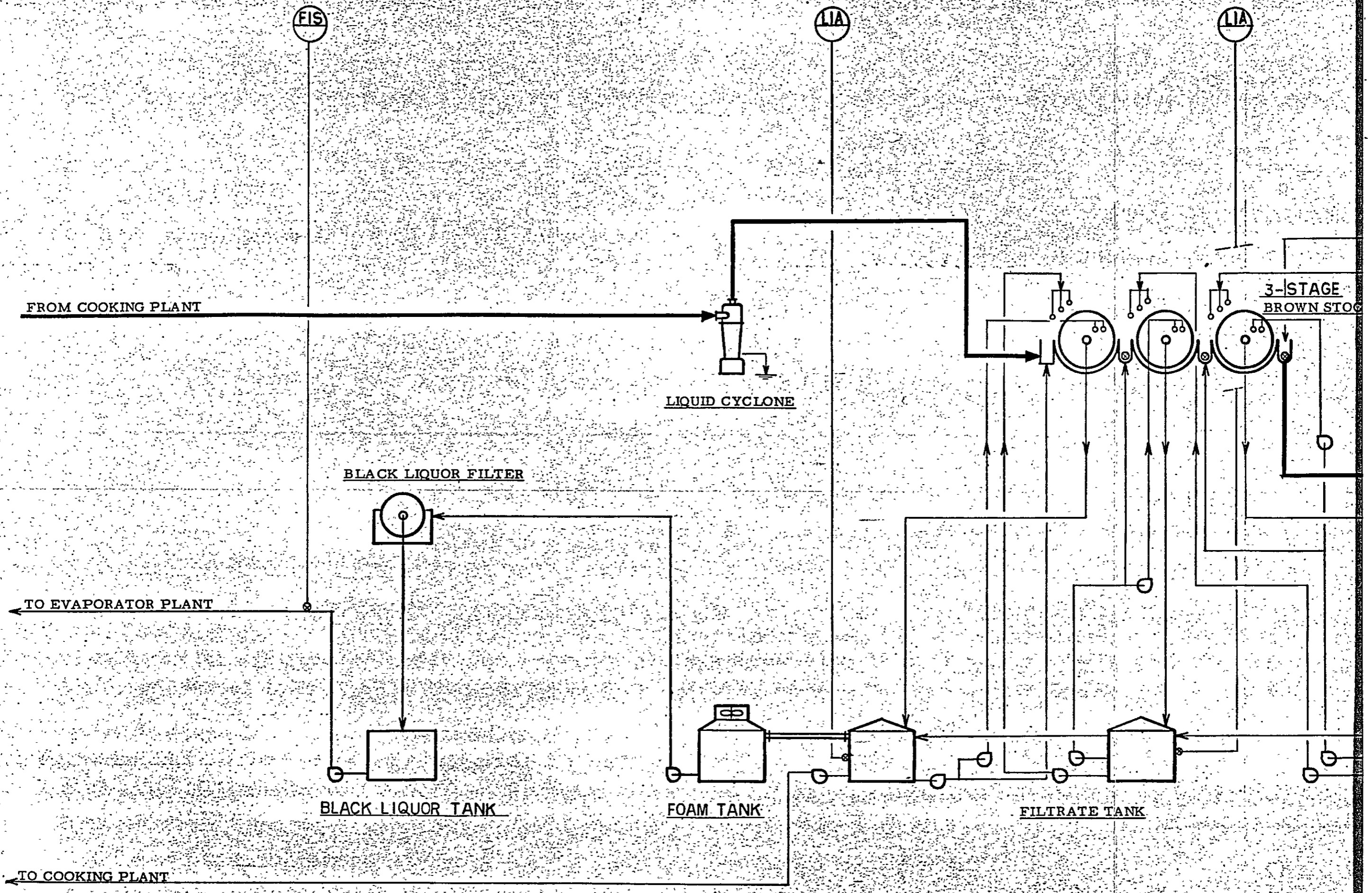


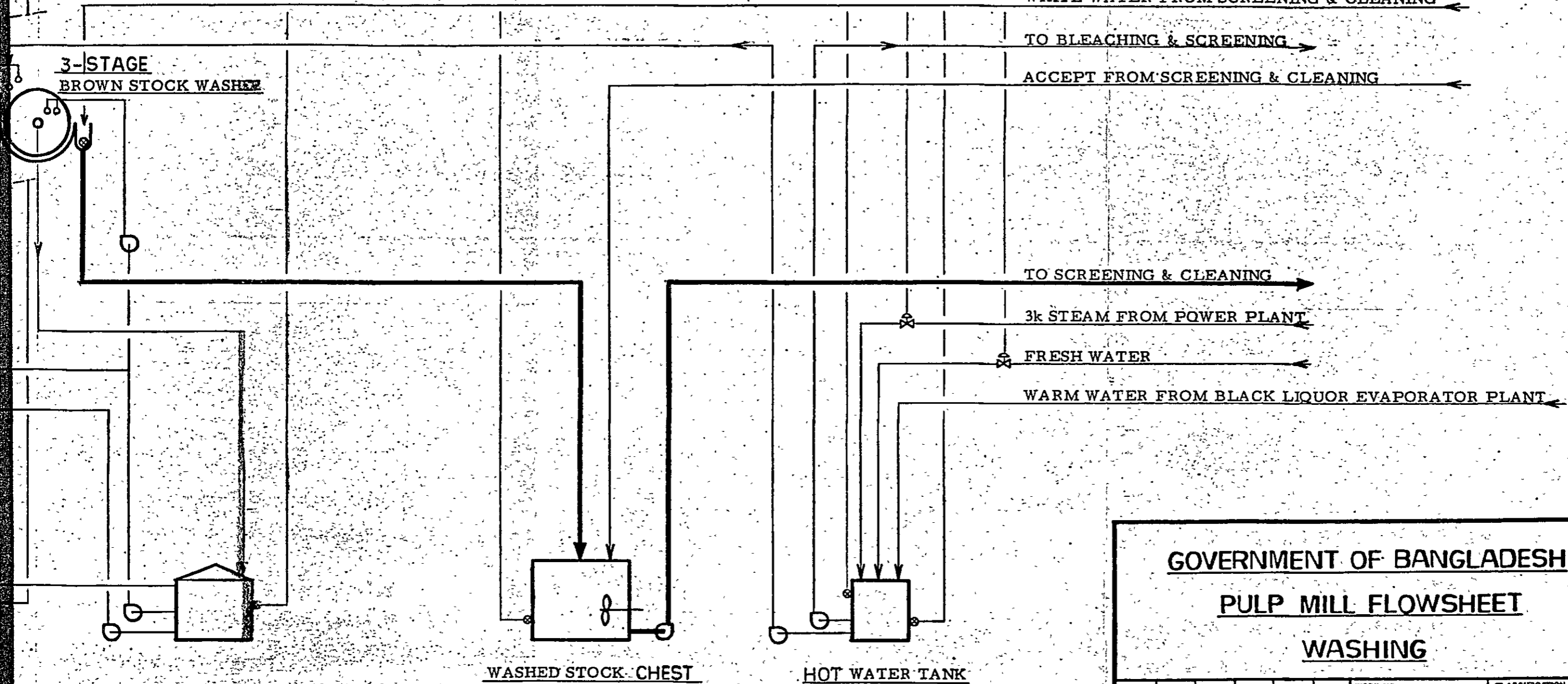
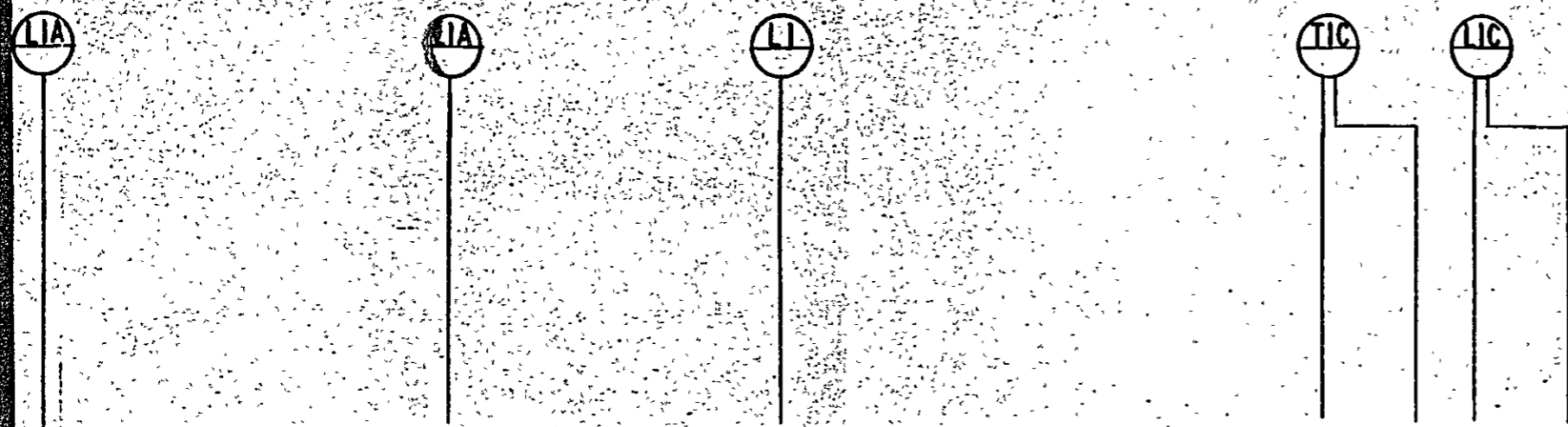
BLOW PAN



GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
COOKING

						WORK NO.	CLASSIFICATION
<i>Done 18/10/81</i> DATE DRAWN BY ENG. CHAR. CHIEF DEPT. MANAG. MANAG.						DRAWING NO.	
JAPAN INTERNATIONAL COOPERATION AGENCY							

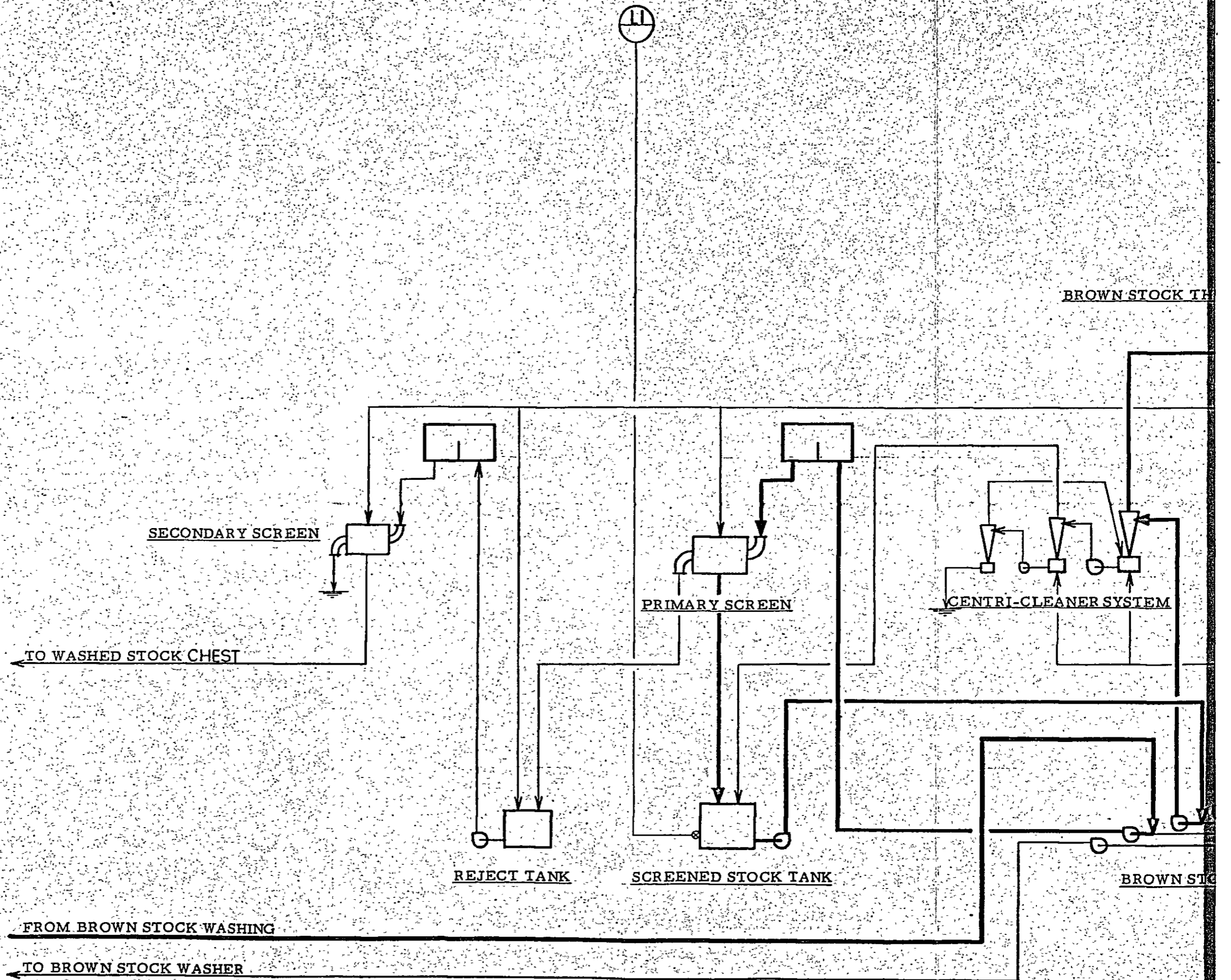


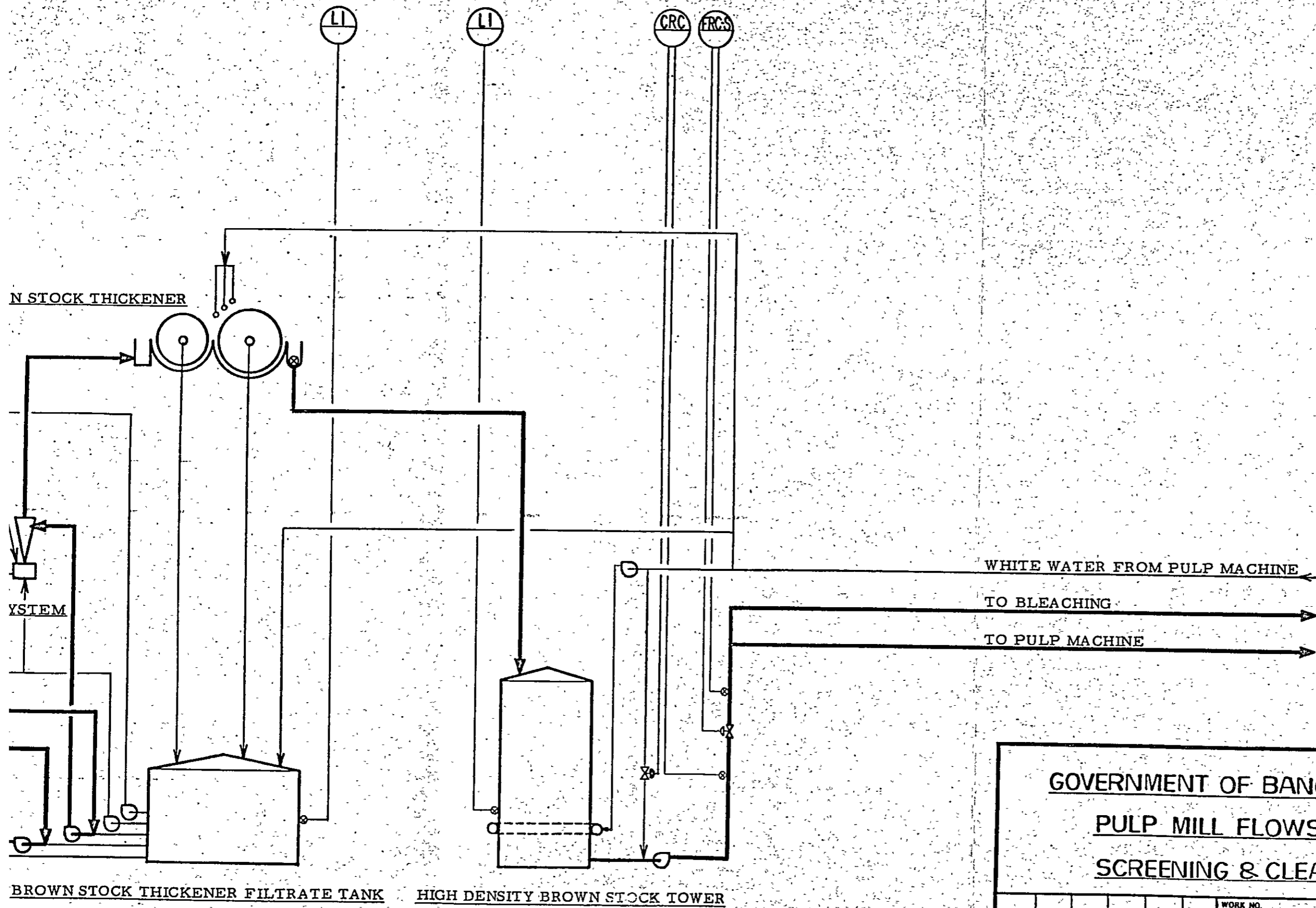


GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
WASHING

						WORK NO.	CLASSIFICATION
						DRAWING NO.	
DATE	DRAWN BY	ENG. CREAR	CHIEF	DEPT. MANAG.	MANAG.		

JAPAN INTERNATIONAL COOPERATION AGENCY





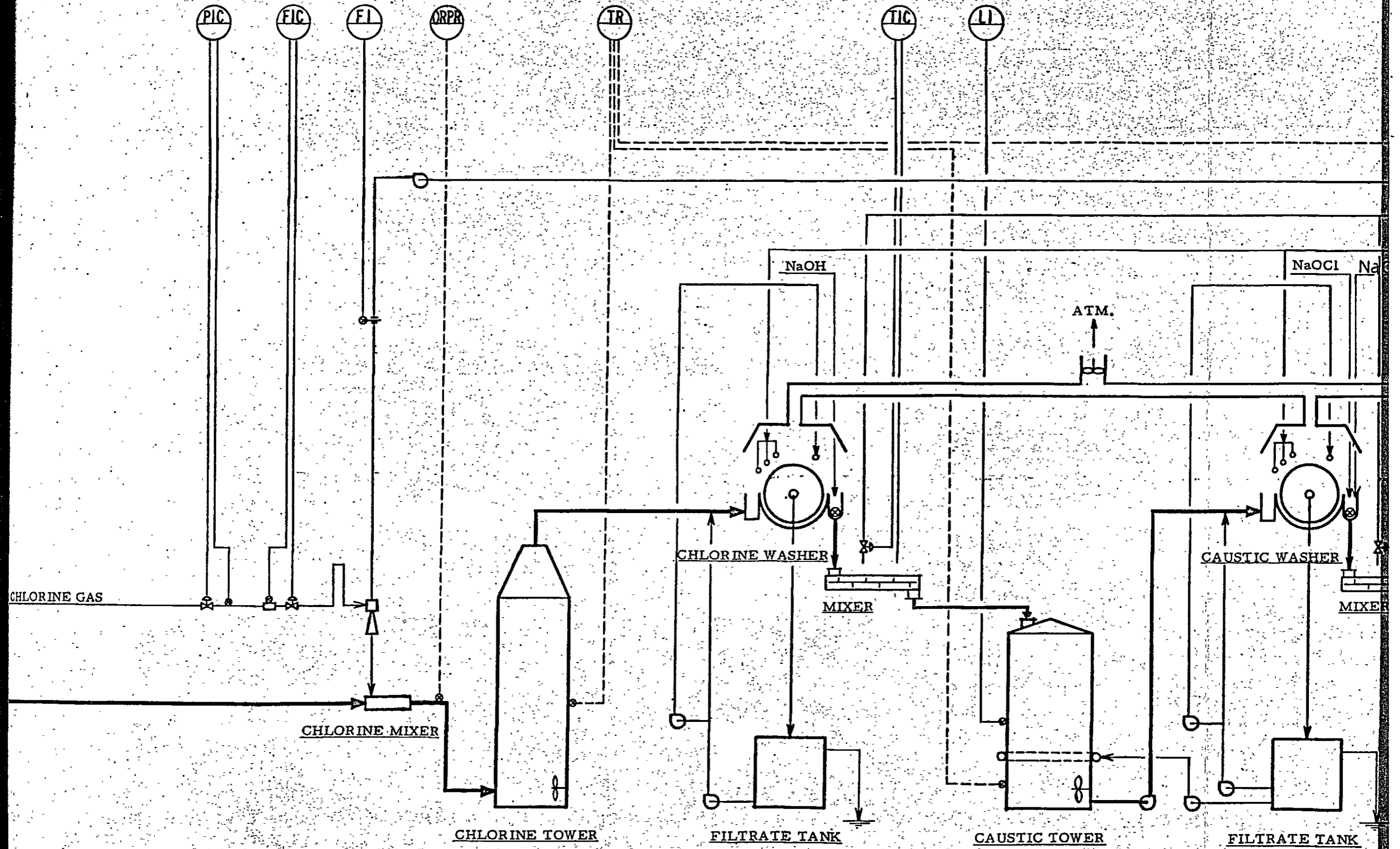
BROWN STOCK THICKENER FILTRATE TANK

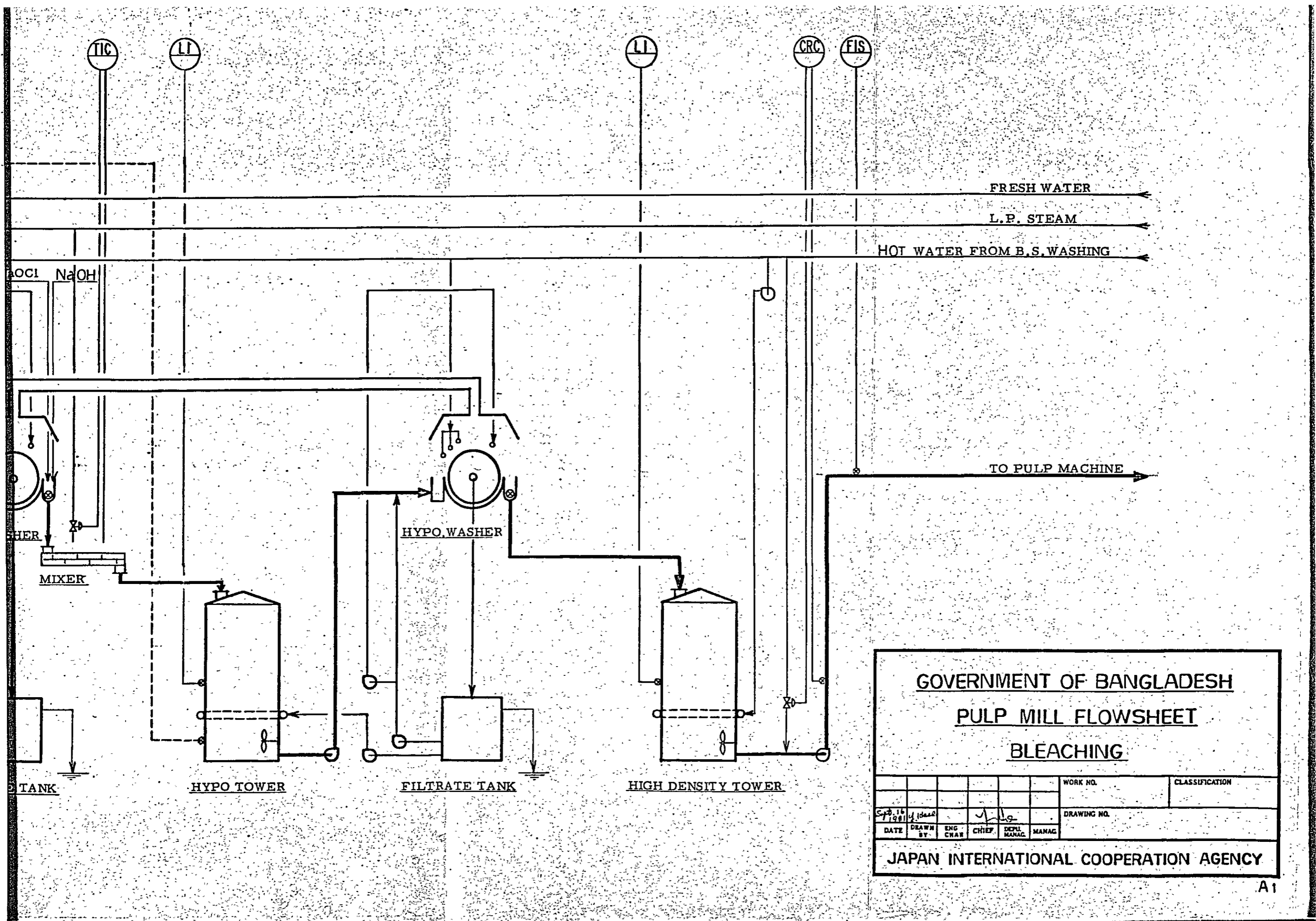
HIGH DENSITY BROWN STOCK TOWER

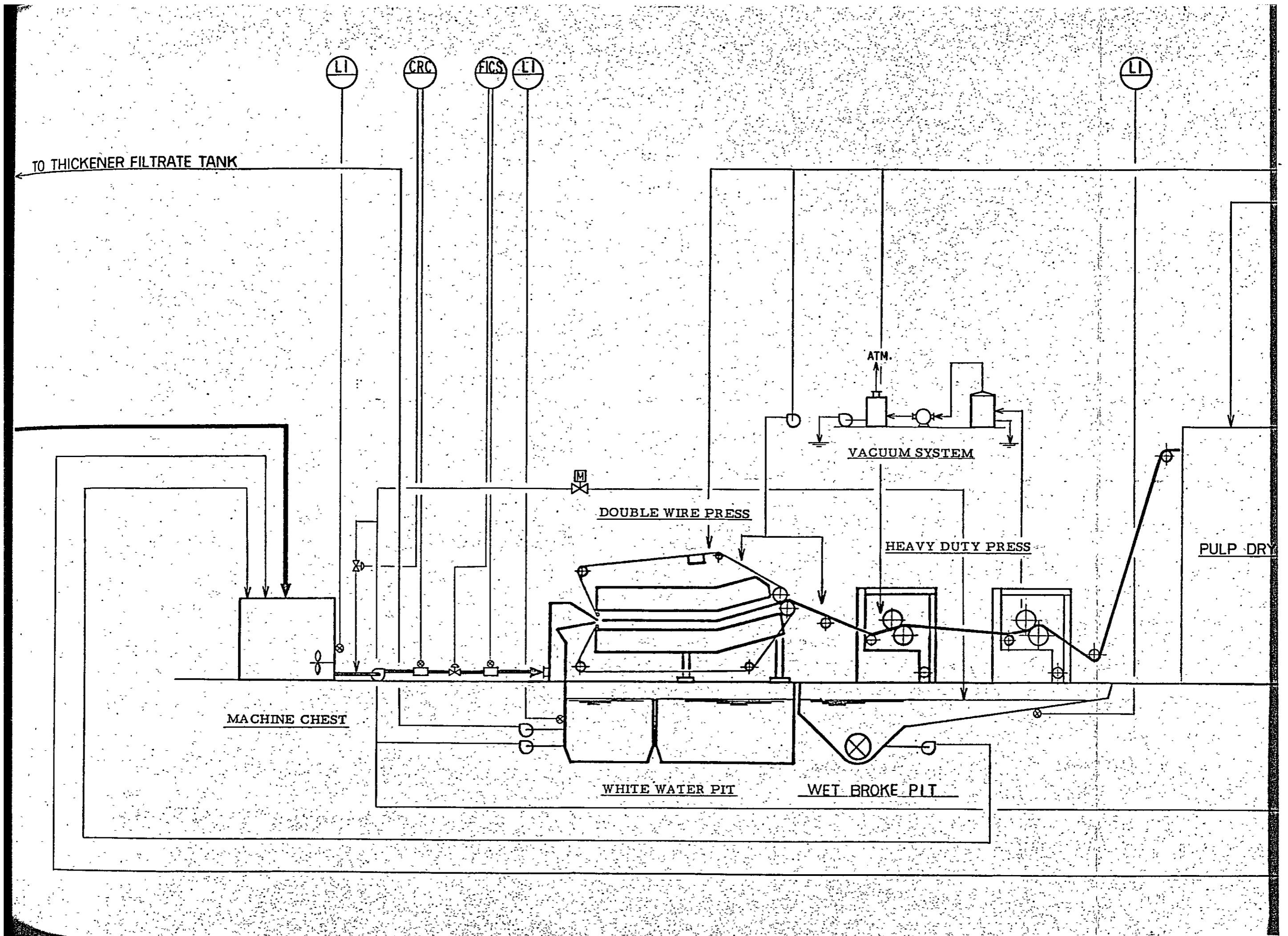
GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
SCREENING & CLEANING

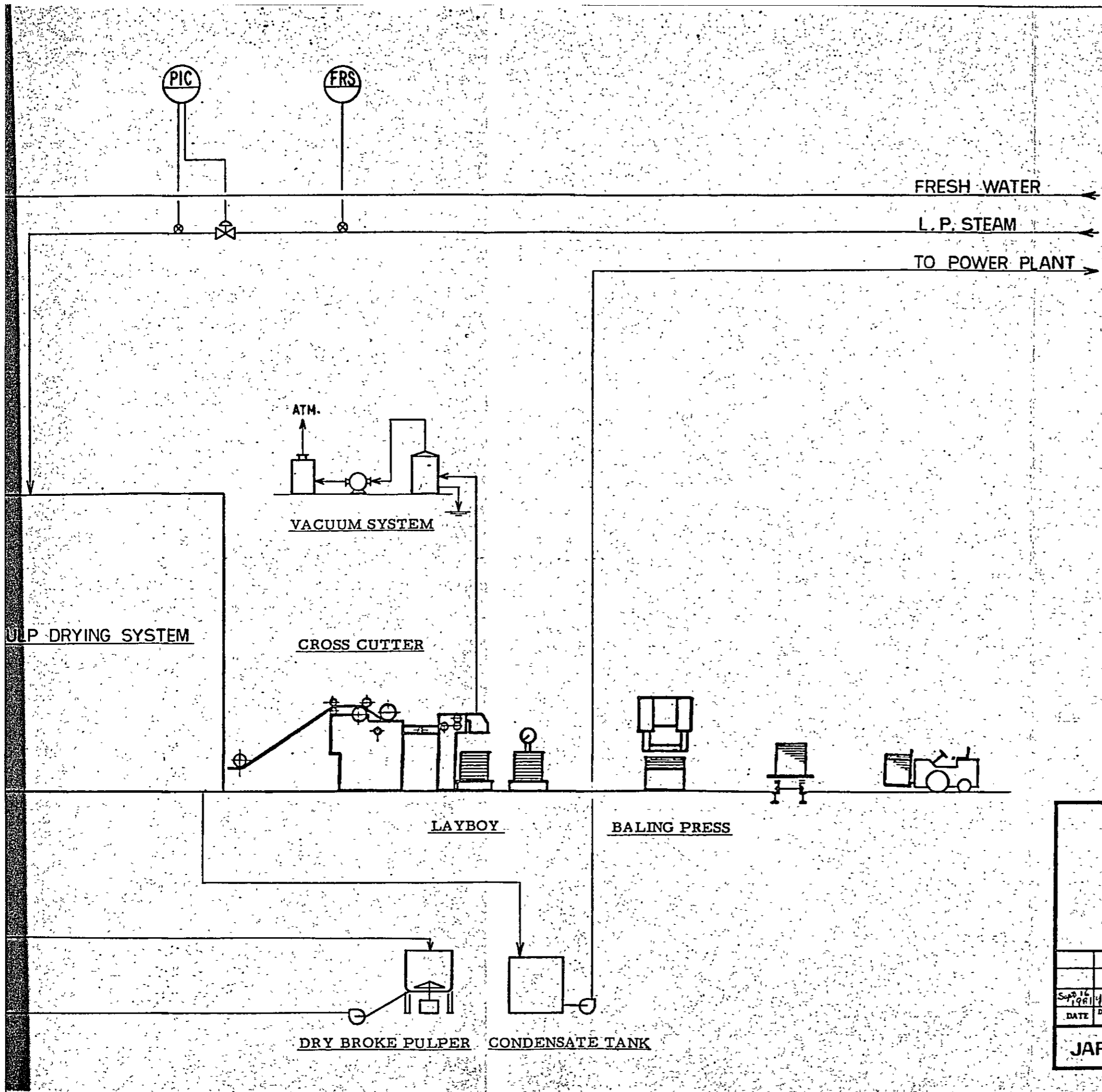
						WORK NO.	CLASSIFICATION
16/1981	J. Khan	M.	J.	J.	J.	DRAWING NO.	
DATE	DRAWN BY	ENG. CHIEF	CHIEF	DEPL. MANAG.	MANAG.		

JAPAN INTERNATIONAL COOPERATION AGENCY









GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
PULP DRYING & FINISHING

						WORK NO.	CLASSIFICATION
16	1981	Haseer	Y. J. S.	Y. J. S.	Y. J. S.	DRAWING NO.	
DATE	DRAWN BY	ENG. CHAB	CHIEF	DEPL. MANAG	MANAG		

JAPAN INTERNATIONAL COOPERATION AGENCY

ATOMIZING AIR

NATURAL GAS

MILL WATER

WEAK LIQUOR FROM RECAUSTICIZING

GREEN LIQUOR TO RECAUSTICIZING

HEAD TANK

INCINERATOR

COOLING WATER

BLOWER

COOLER

DISSOLVER

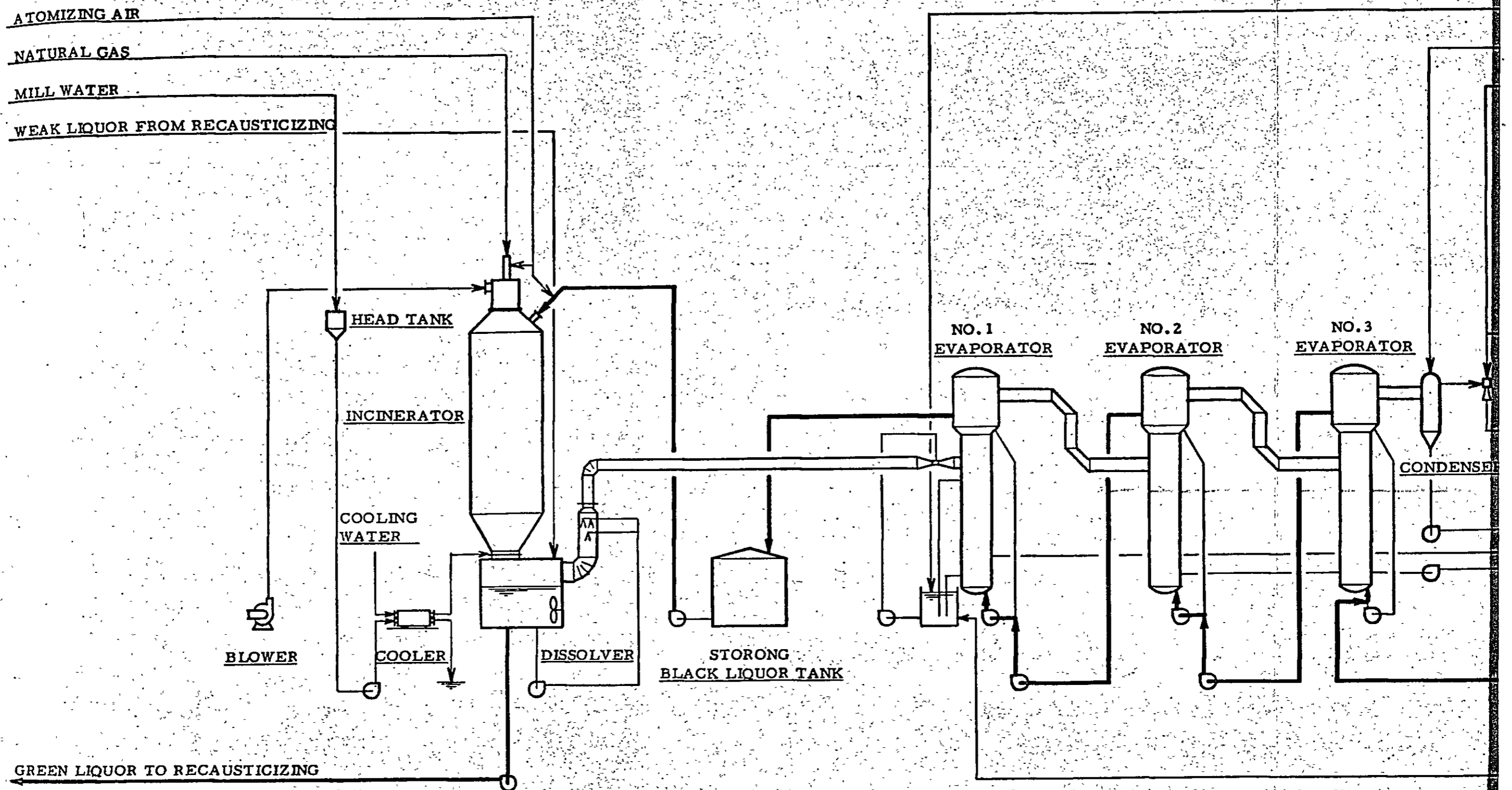
STORONG
BLACK LIQUOR TANK

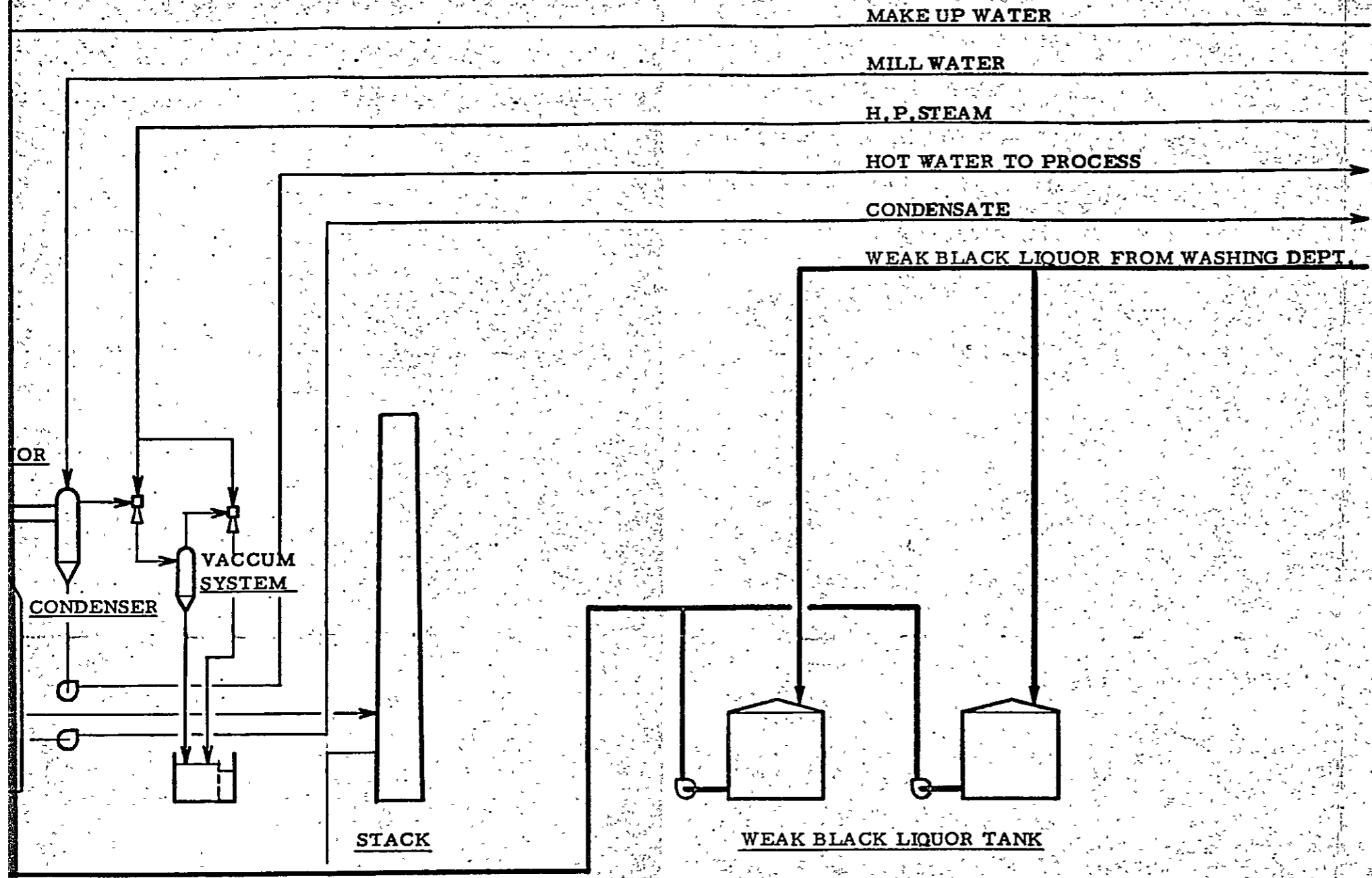
NO. 1
EVAPORATOR

NO. 2
EVAPORATOR

NO. 3
EVAPORATOR

CONDENSE

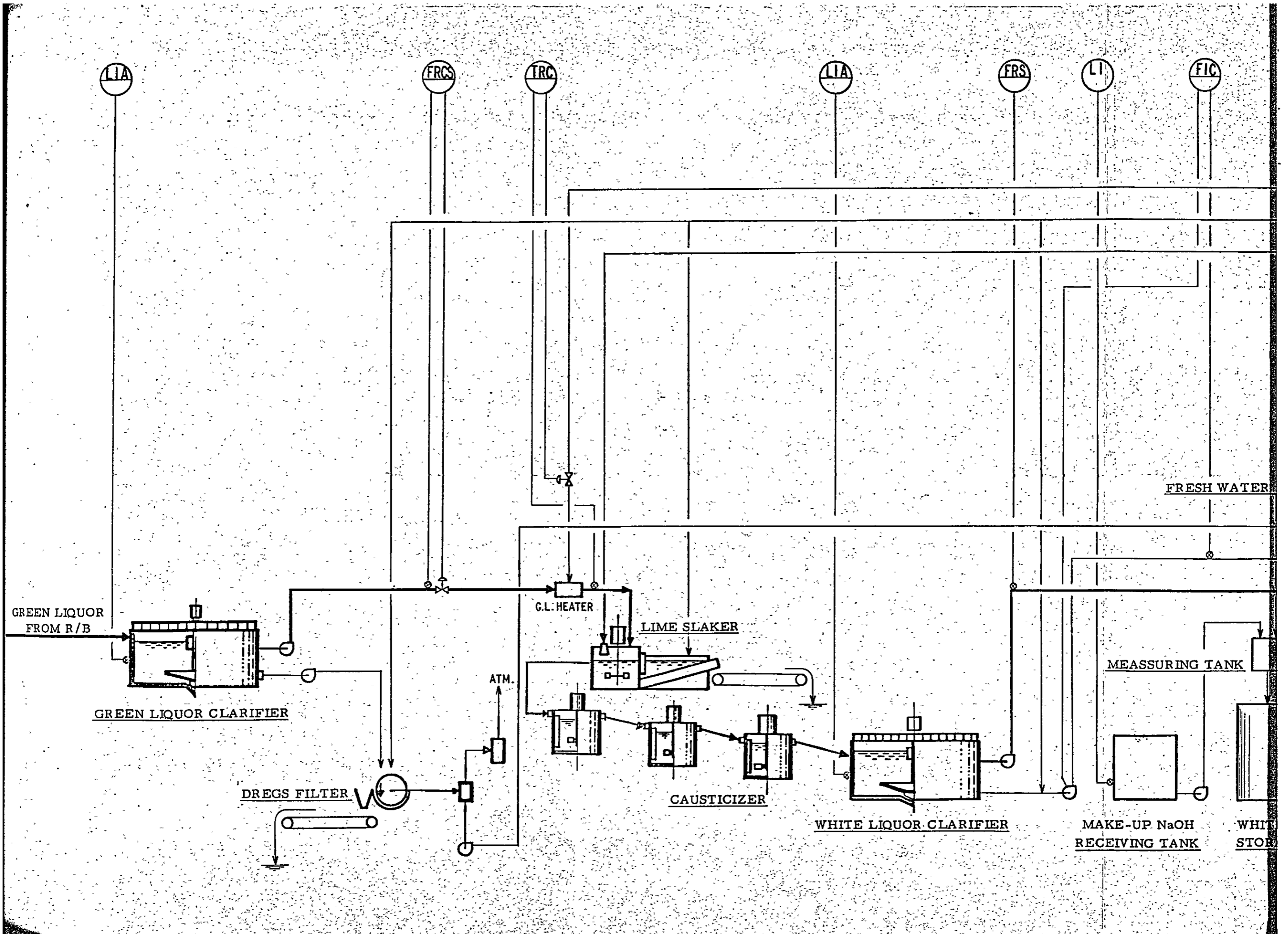


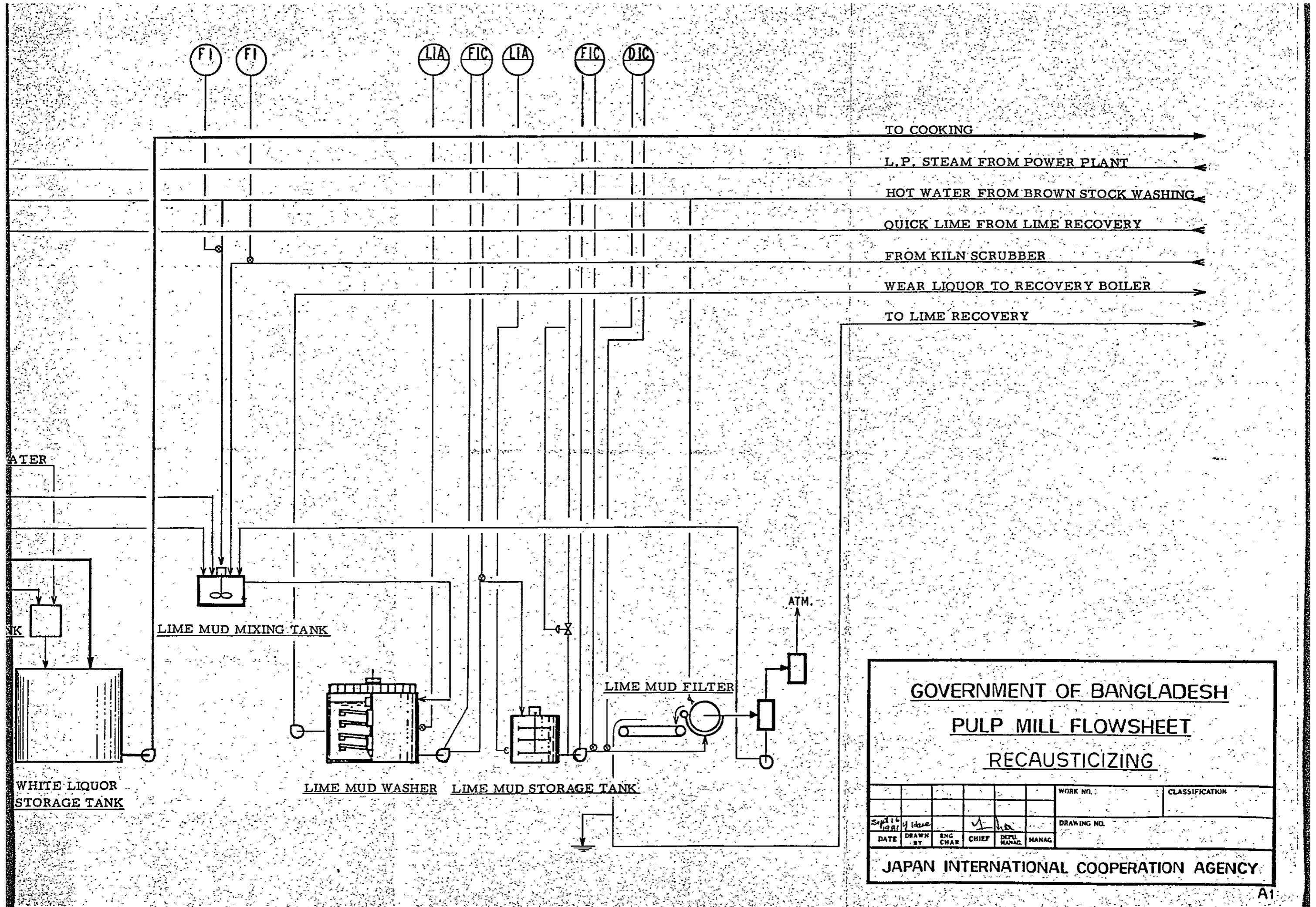


GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
BLACK LIQUOR EVAPORATOR
& INCINERATION SYSTEM

						WORK NO.	CLASSIFICATION
Dec. 19 1981	1/102					DRAWING NO.	
DATE	DRAWN BY	ENG. CHAR	CHIEF	DEPLI MANAG.	MANAG		

JAPAN INTERNATIONAL COOPERATION AGENCY

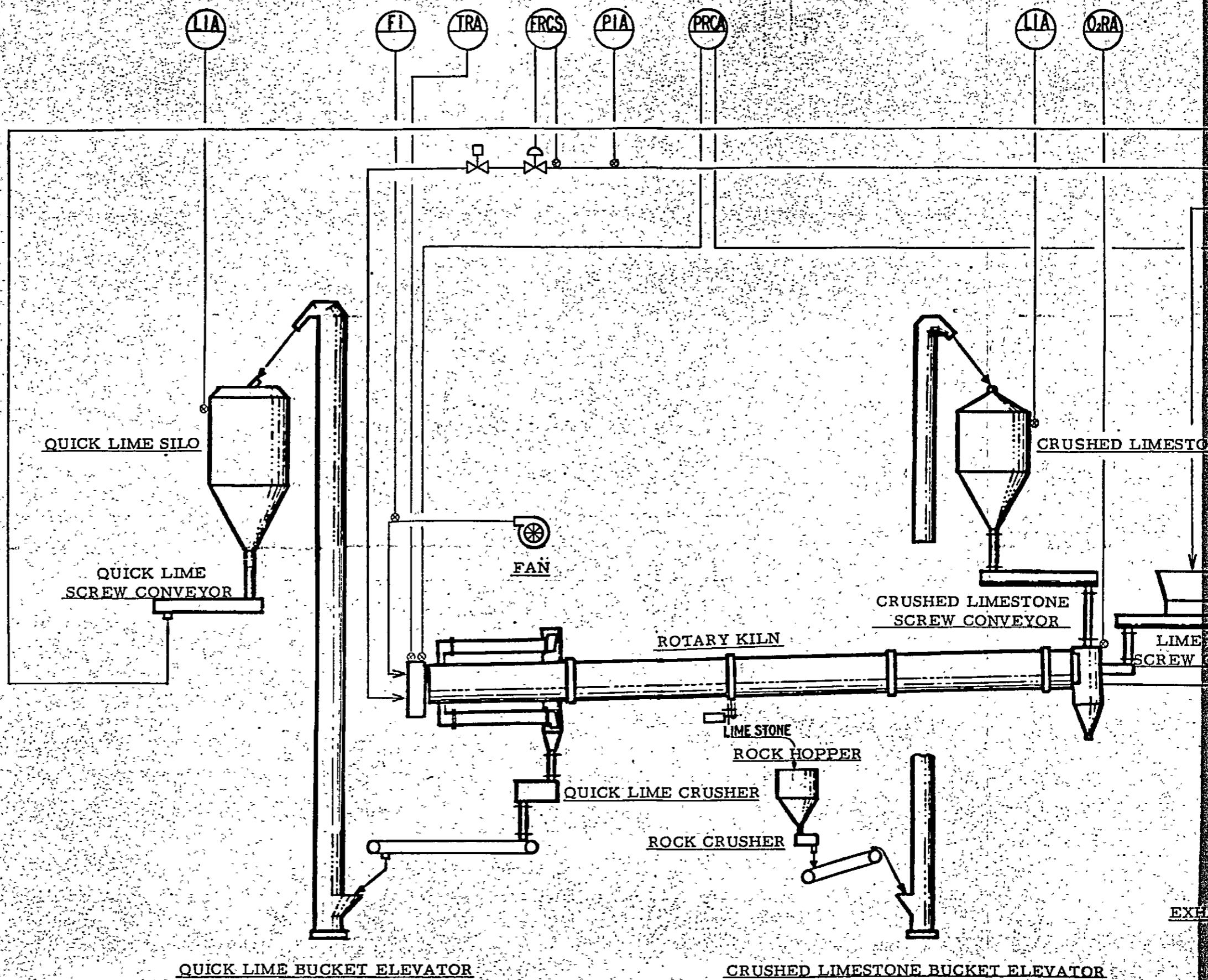


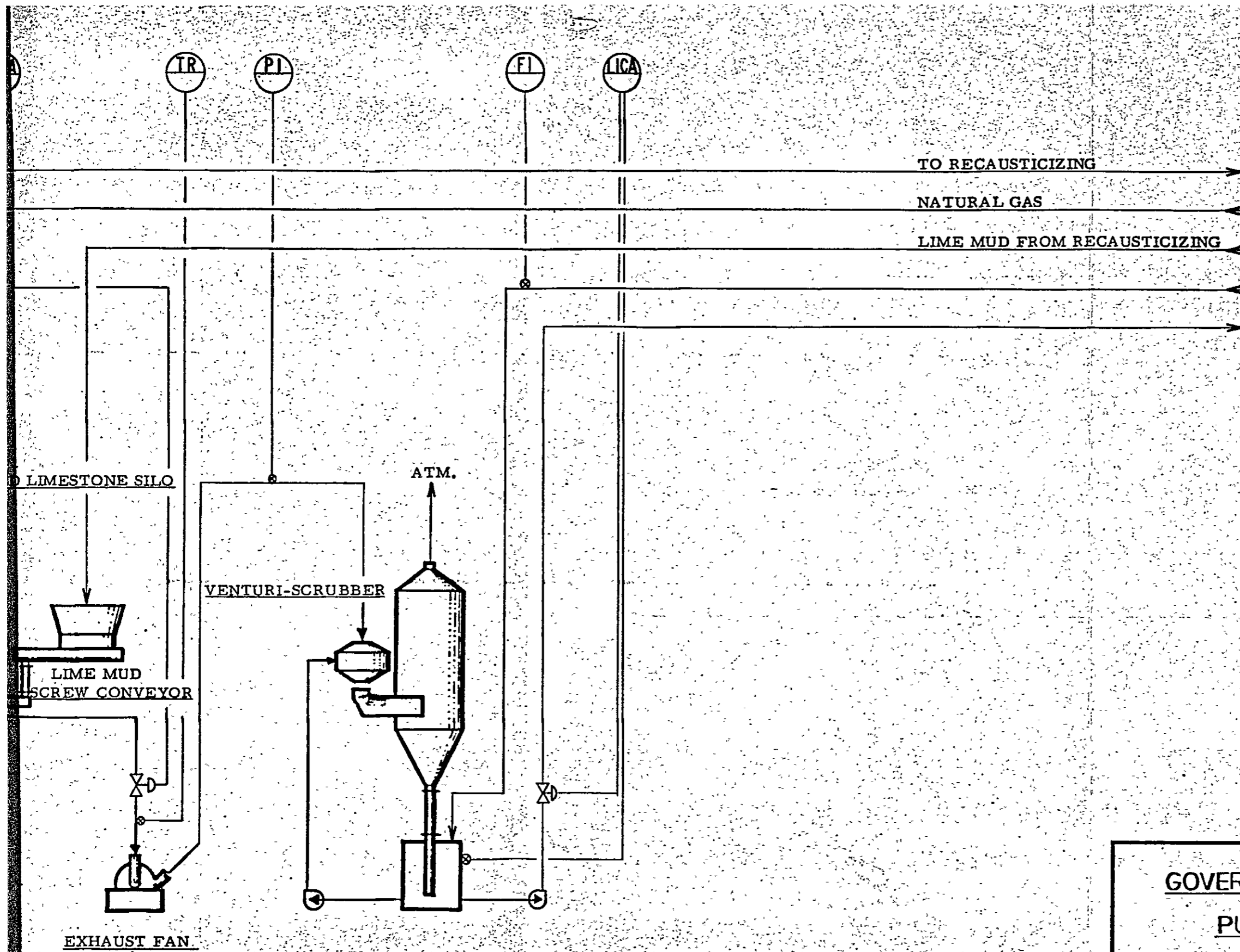


GOVERNMENT OF BANGLADESH
 PULP MILL FLOWSHEET
 RECAUSTICIZING

						WORK NO.	CLASSIFICATION
DATE	DRAWN BY	ENG. CHARG.	CHIEF	DEPUTY MANAG.	MANAG.	DRAWING NO.	

JAPAN INTERNATIONAL COOPERATION AGENCY

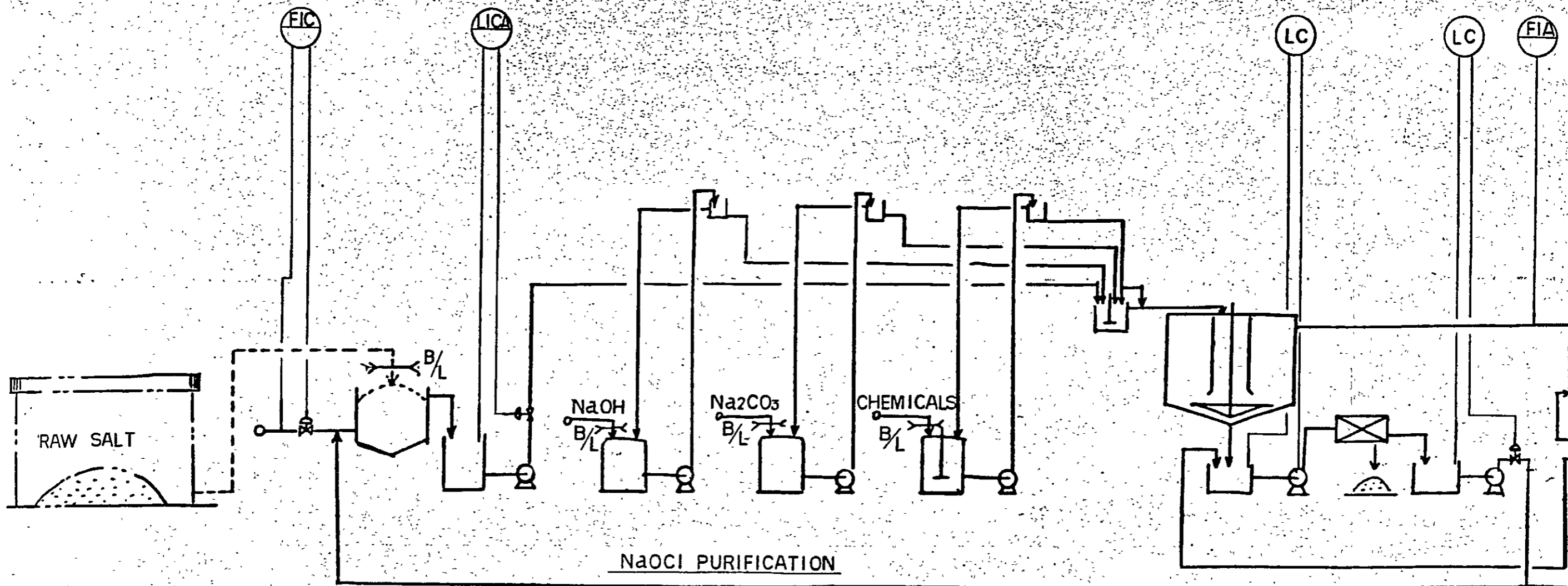


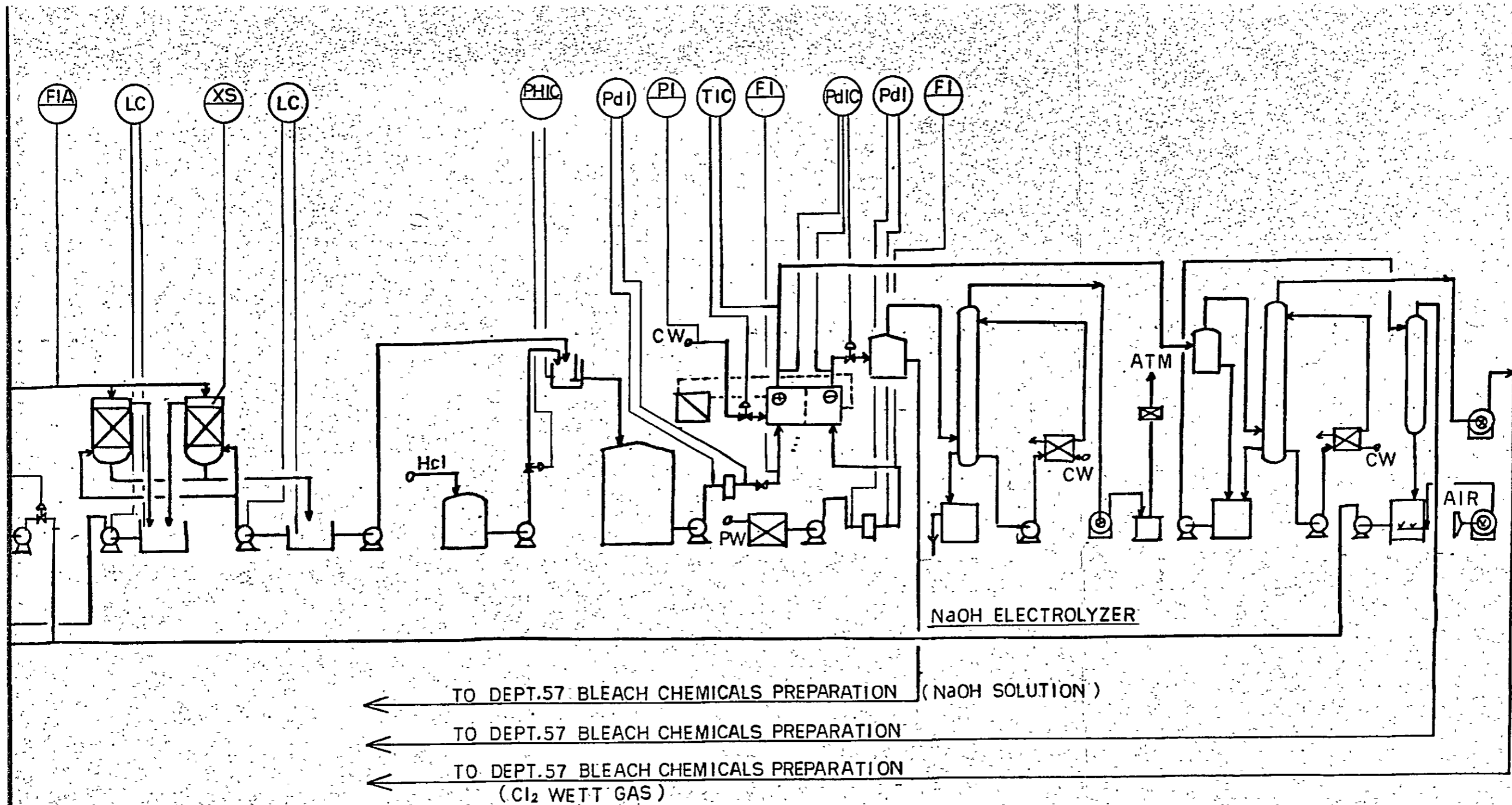


GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
LIME RECOVERY

						WORK NO.	CLASSIFICATION
Sept. 16 1981	J. Islam	J. Islam	J. Islam	J. Islam	J. Islam	DRAWING NO.	
DATE	DRAWN BY	ENG. CHIEF	CHIEF	DEPL. MANAG.	MANAG.		

JAPAN INTERNATIONAL COOPERATION AGENCY

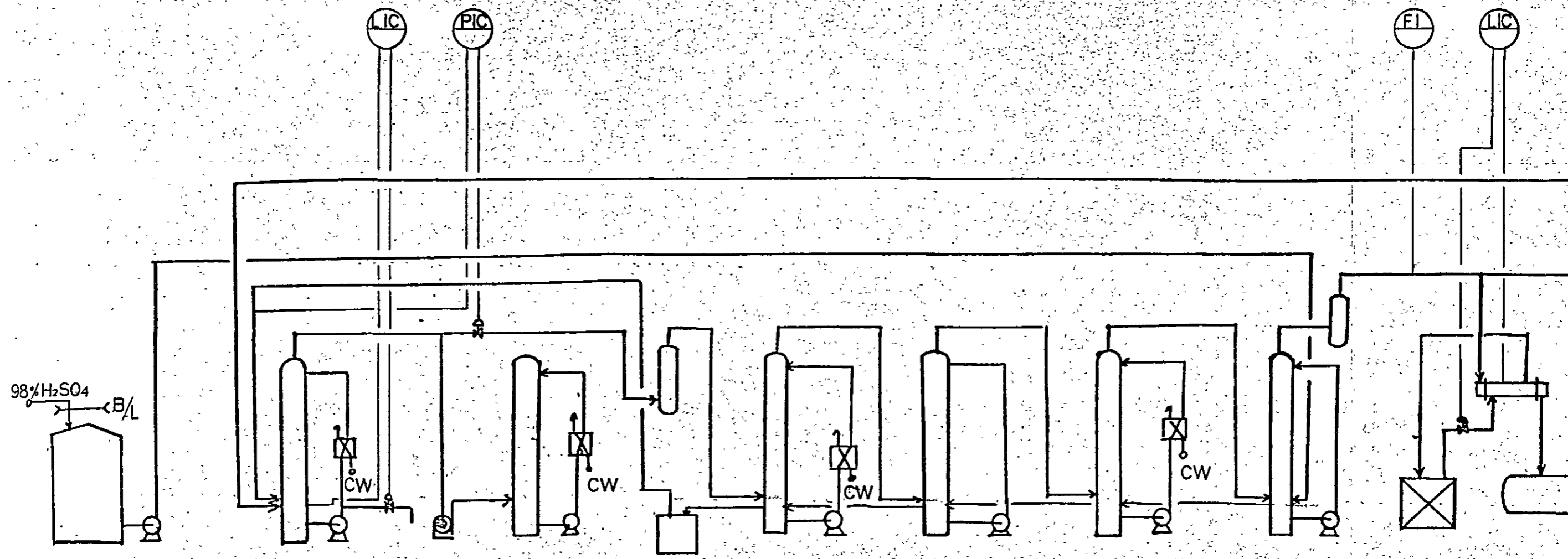




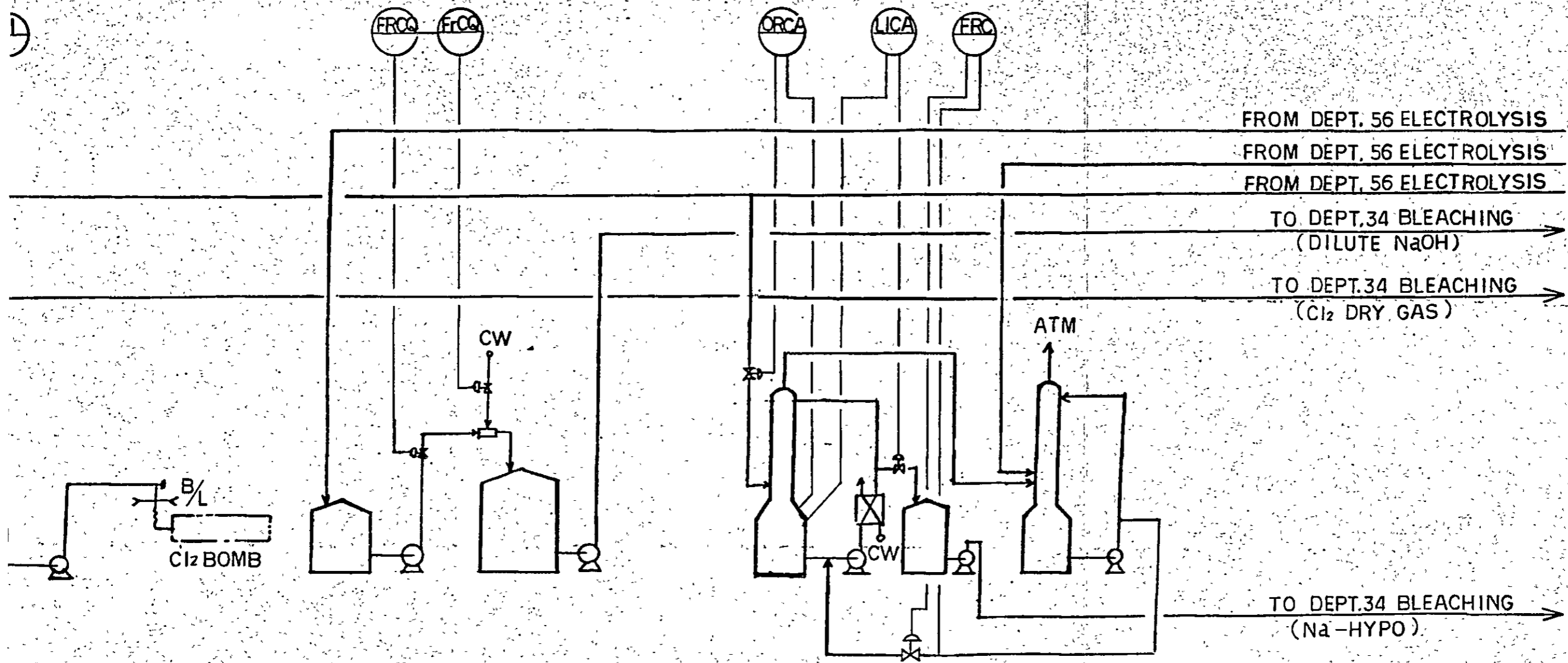
GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
ELECTROLYSIS.

						WORK NO.	CLASSIFICATION
DEC 16 1981	K. A.	M. Idara				DRAWING NO.	
DATE	DRAWN BY	ENG CHARG	CHIEF	DEPL. MANAG.	MANAG.		

JAPAN INTERNATIONAL COOPERATION AGENCY

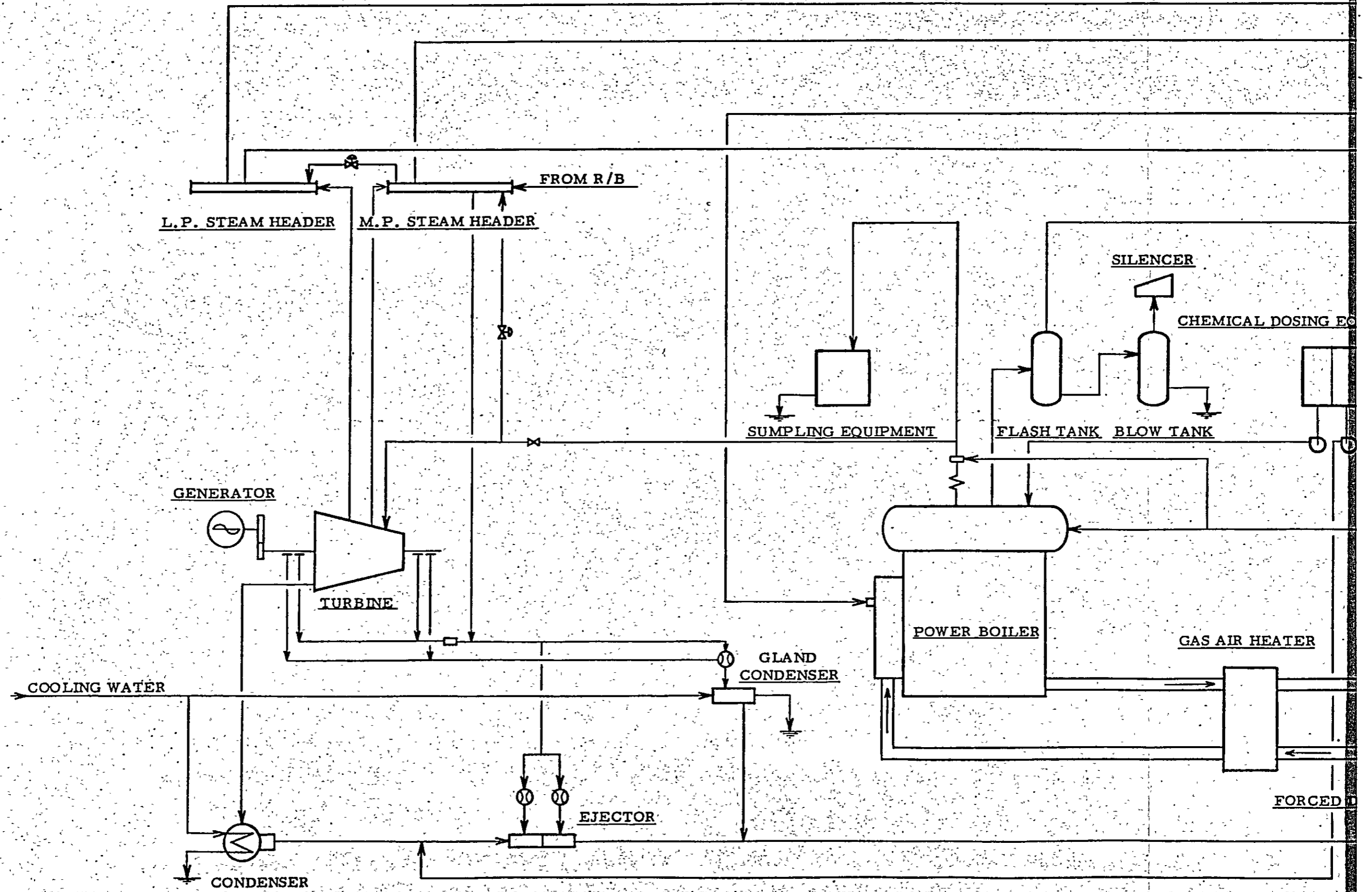


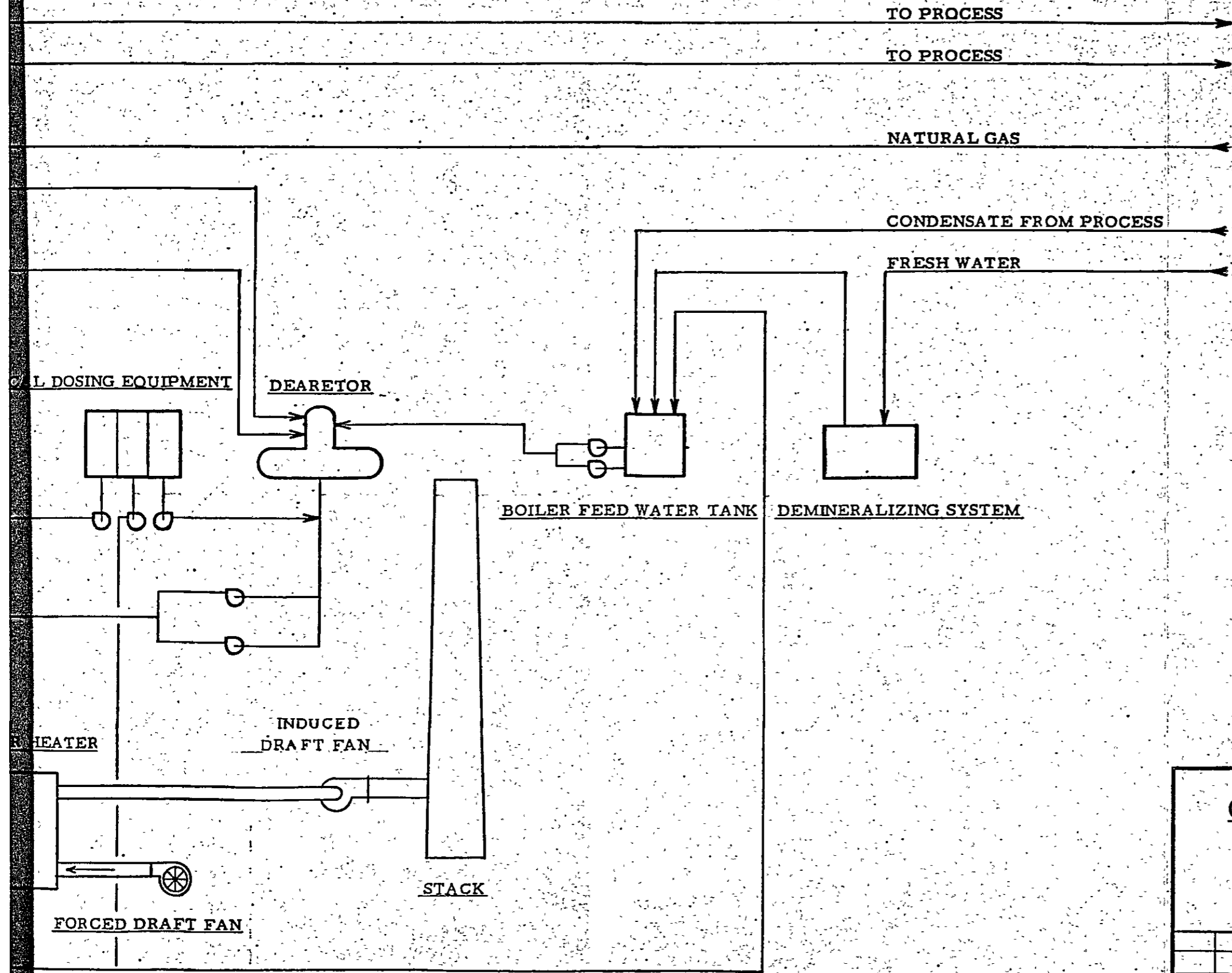
CHLORINE LIQUIDIZING



Na-HYPO PREPARATION

GOVERNMENT OF BANGLADESH						
PULP MILL FLOWSHEET						
BLEACH CHEMICALS PREPARATION						
						WORK NO.
						CLASSIFICATION
DEC. 16 1981	R. A. M.	M. A. M.				DRAWING NO.
DATE	DRAWN BY	ENG. CHAR.	CHIEF	DEPT. MANAG.	MANAG.	
JAPAN INTERNATIONAL COOPERATION AGENCY						





GOVERNMENT OF BANGLADESH
PULP MILL FLOWSHEET
POWER PLANT

						WORK NO.	CLASSIFICATION
Sept 16 1991	U. Hossain		V. J.			DRAWING NO.	
DATE	DRAWN BY	ENG CHAR	CHIEF	DEPU MANAG.	MANAG.		
JAPAN INTERNATIONAL COOPERATION AGENCY							