Council of Enviro Excellence

NATIONAL WASTE MANAGEMENT

SUMMIT AND AWARDS 2025

With a special emphasis on Fly Ash & Gypsum Utilization

A PERSPECTIVE ON WASTE MANAGEMENT IN POWER PLANT

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SOURCES AND TYPES OF LIQUID WASTE IN POWER PLANTS

- High turbid / suspended solid effluents
- High dissolved solids effluents, including acidic /alkaline effluents
- Oily effluents
- Sewage effluents

SOURCES AND TYPES OF SOLIID WASTE IN POWER PLANTS

- Power Plant site (Boiler slag, Ash- fly, bottom, Coal handling etc.)
- Outside Plant Boundary e.g., Jetty -waste from the transfer barges
- Township (from residents & commercial enterprises)
- Green areas (Grass, leaves, etc.)
- By-product generation (e.g., Gypsum in FGD plant)
- Scrap generation (metal, packaging, insulation materials etc.)

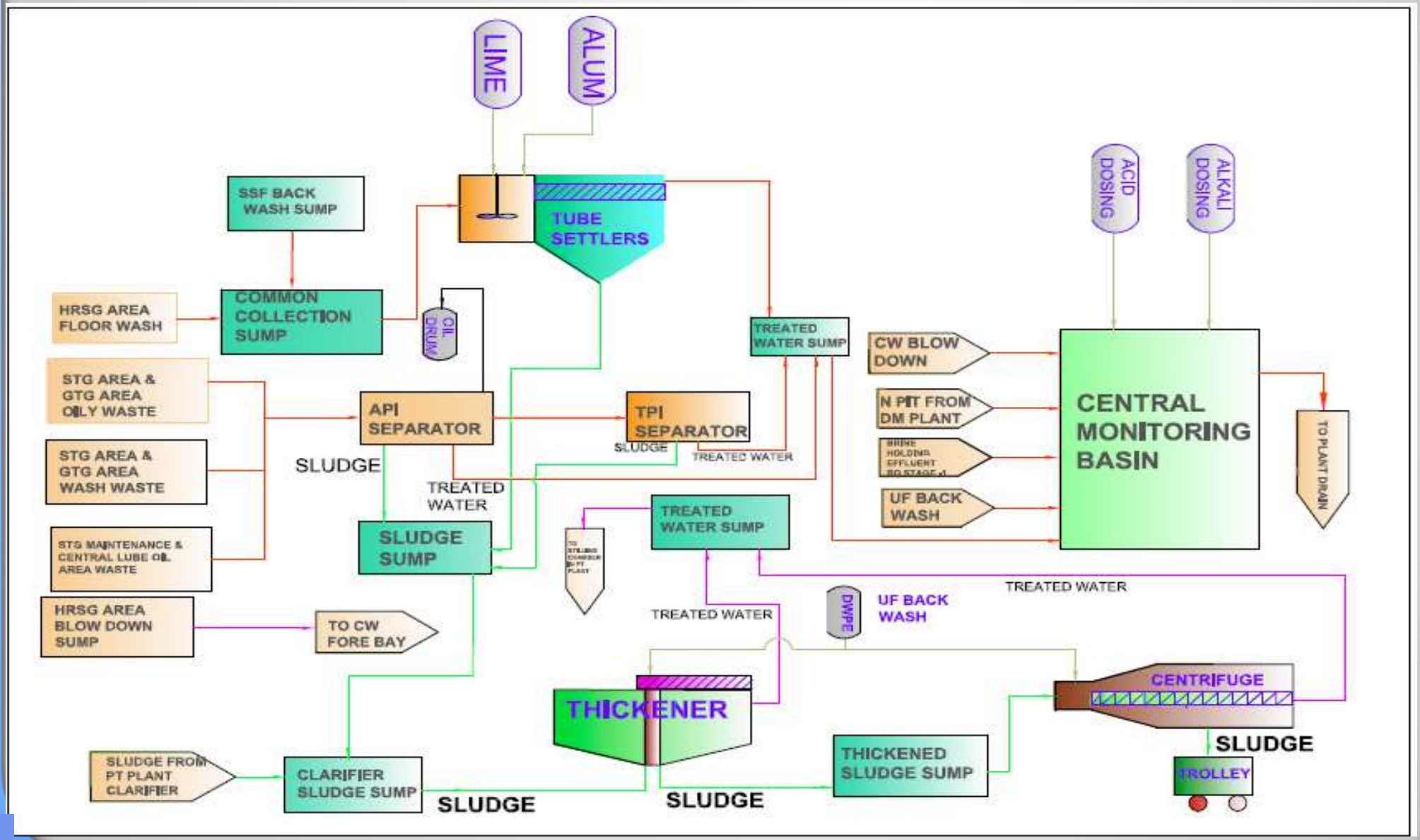
Old practice of Effluent treatment

Discharge the treated effluents outside the plant boundary after meeting the applicable environmental regulations.

Each category of effluent is treated appropriately for removal of oil, suspended solids, dissolved solids and pH correction.

All effluents are collected in CMB , checked for quality before safe disposal.

EFFLUENT TREATMENT PLANT
CONVENTIONAL ETP



EFFLUENT QUALITY BEFORE DISPOSAL

pH	: 6.5 to 9.0
TOTAL SUSPENDED SOLID	: 100 ppm
FREE OIL AND GREASE	: 10 ppm
FREE CHLORINE	: 0.5 ppm

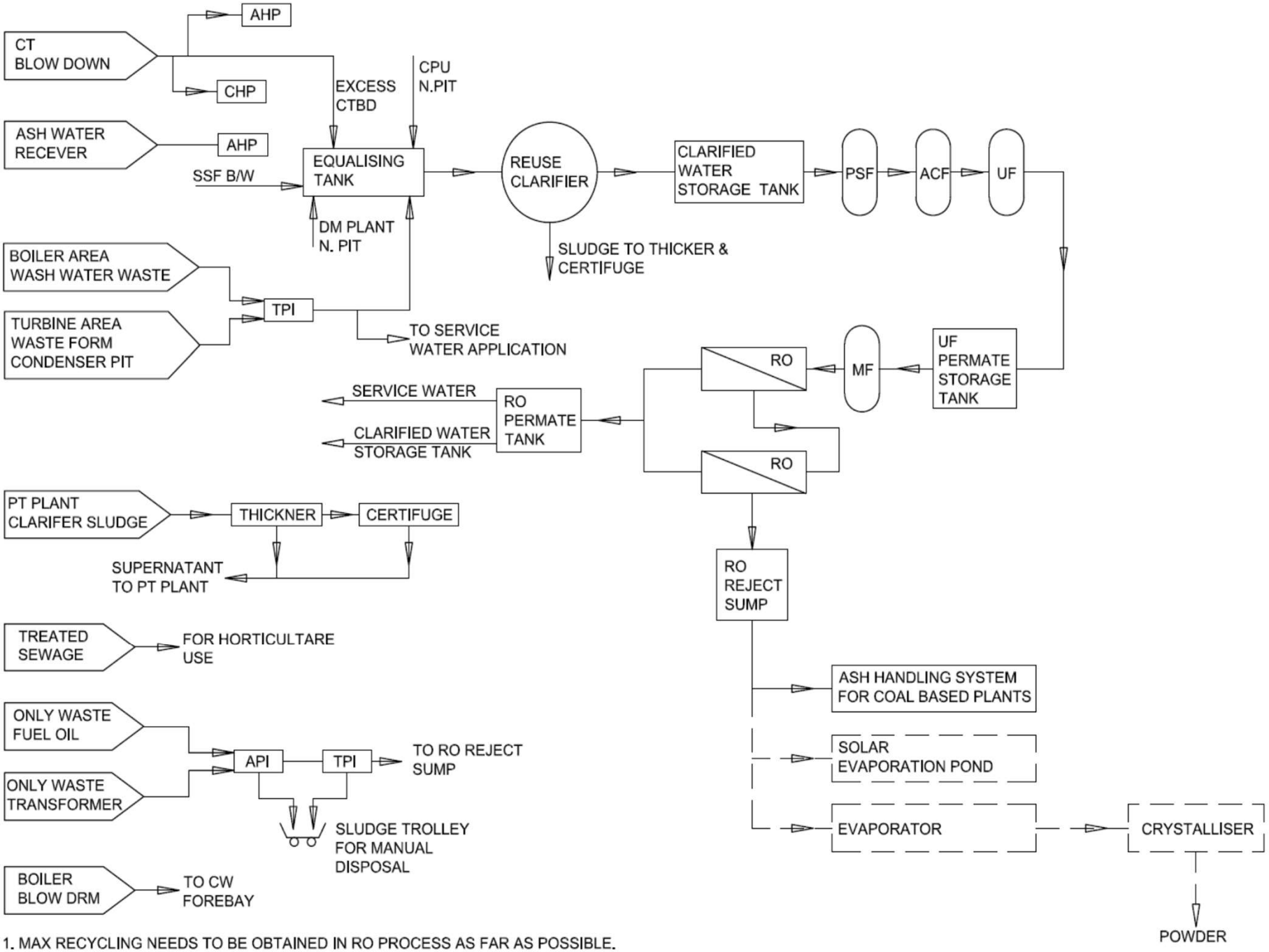
Zero liquid discharge is an integrated system approach to minimize, treat and reuse the waste so that no water effluent except the storm water is discharged outside the plant boundary.

AIM OF ZLD

- Minimizing the water consumption and thus the waste generation
- Minimizing the waste generation by suitable selection of the process and also optimizing the operation philosophy
- Recover, treat and reuse the treated water

Minimizing the water consumption and thus the waste generation

- Use of Dry cooling towers : Reduce the cooling water consumption up to 1.2 m3/MW compared to 2.8 to 3 m3/MW for the water cooled condensers.
  - Limitations
    - Poor heat rate of the plant
    - More susceptible to ambient temperature changes than wet –cooled condensers
    - Increased Condensate temperature affecting the CPU performance
    - Significant Flow accelerated corrosion
- Use of Dry bottom ash disposal system
  - This will reduce the makeup water requirement for the ash conveying system.
- Operational approach towards house keeping
- Increase COC
  - This will reduce the makeup water requirement for the plant.



1. MAX RECYCLING NEEDS TO BE OBTAINED IN RO PROCESS AS FAR AS POSSIBLE.
2. IN CASE OF NON COAL BASED PLANTS, WHERE ASH HANDLING IS NOT APPLICABLE, THE FINAL RO REJECT CAN BE EITHER SENT TO SOLAR POND OR CAN BE TREATED THROUGH EVAPORATOR AND CRYSTALLISER.
3. BASED ON THE RAW WATER ANALYSIS, SITE CONDITION AND PLANT PRACTICES THE RECYCLING APPROACH CAN CHANG.

SCHEMATIC - 4

TYPICAL RECYCLING FOR THERMAL POWER PLANT TO ACHIEVE ZLD

Challenges

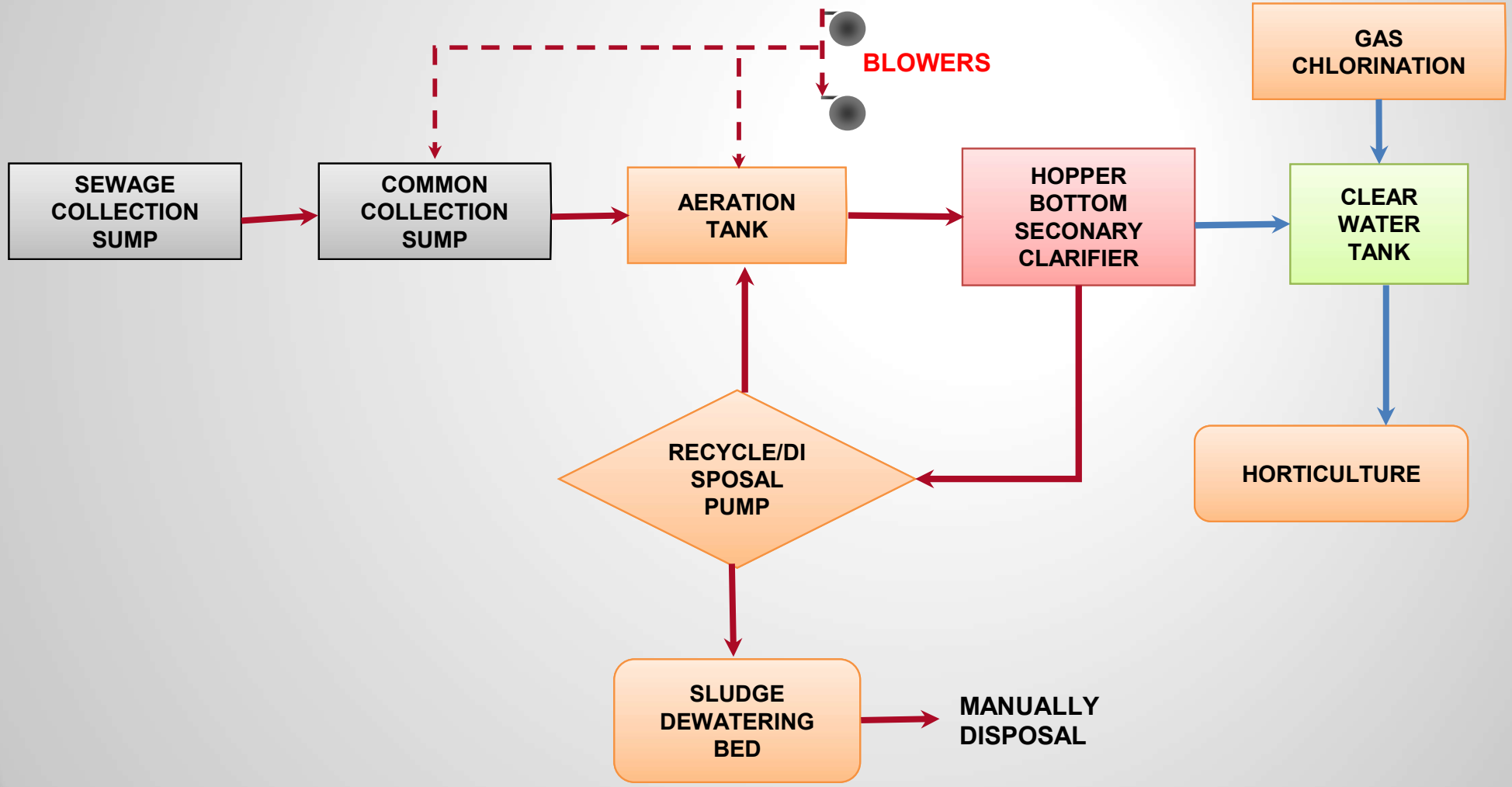
- Higher capital cost
- Higher foot print requirement
  - The typical area requirement for solar evaporation pond is 0.05 acre per m3 of brine considering an evaporation rate of 7mm/m2/day. This is not a recommended option for rainy places and also where land availability is a constraint.
- Higher operating cost
  - Typically the brine concentrator requires about 18 to 24 kW per m3 of feed while the crystallizer requires around 65 to 80 kW per m3 of feed.

SEWAGE TREATMENT PLANT

- Sewage is commonly a cloudy dilute aqueous solution containing mineral and organic matter, mainly human excreta, soap & detergents, metals, glass, rubbish, garden waste and sewage sludge etc.
- In power plants sewage is generated mainly from administrative buildings, toilets , canteens and other utilities.

- Major Technologies followed
  - Aeration based
  - Bio toilet Based STP

SEWAGE TREATMENT PLANT
(1500 MW PRAGATI – III CCPP, CAPACITY 50 M3/DAY)



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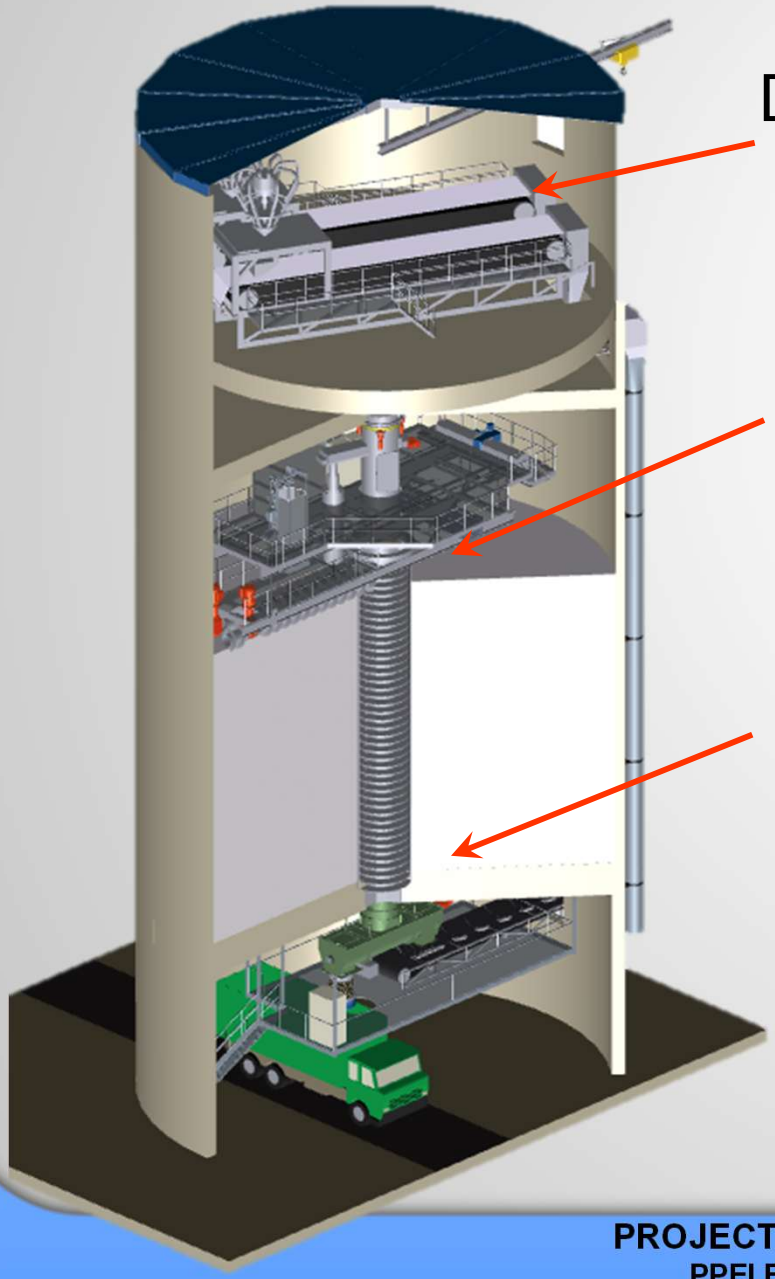
FGD Gypsum Handling

The infrastructure provided shall envisage **collection**, **treatment**, **storage** and **transfer** of FGD gypsum for complete utilization.

There shall be adequate storage facilities to hold the FGD gypsum stock in case the options for utilization are yet to be finalized.

Source: CEA document

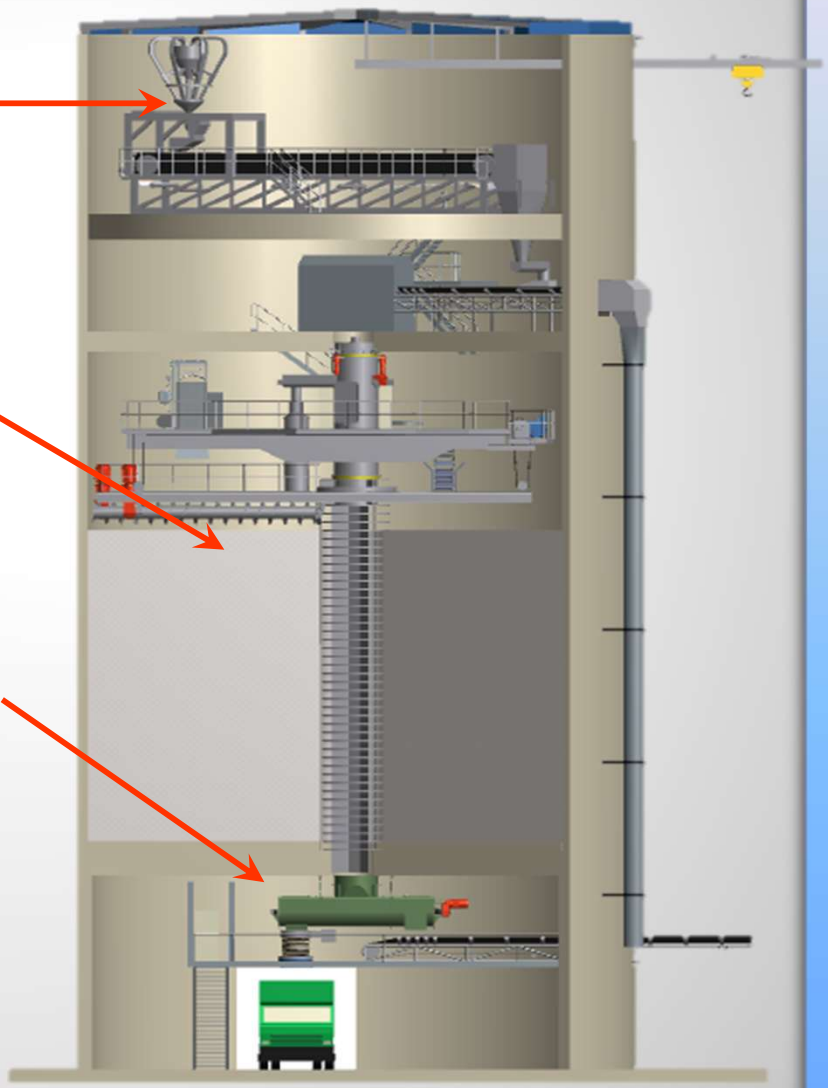
FGD-Gypsum Handling system - typical



Dewatering Section

Storage Section

Load Out Section



THANK YOU