Assessment Of High Concentration Ash Slurry Disposal System

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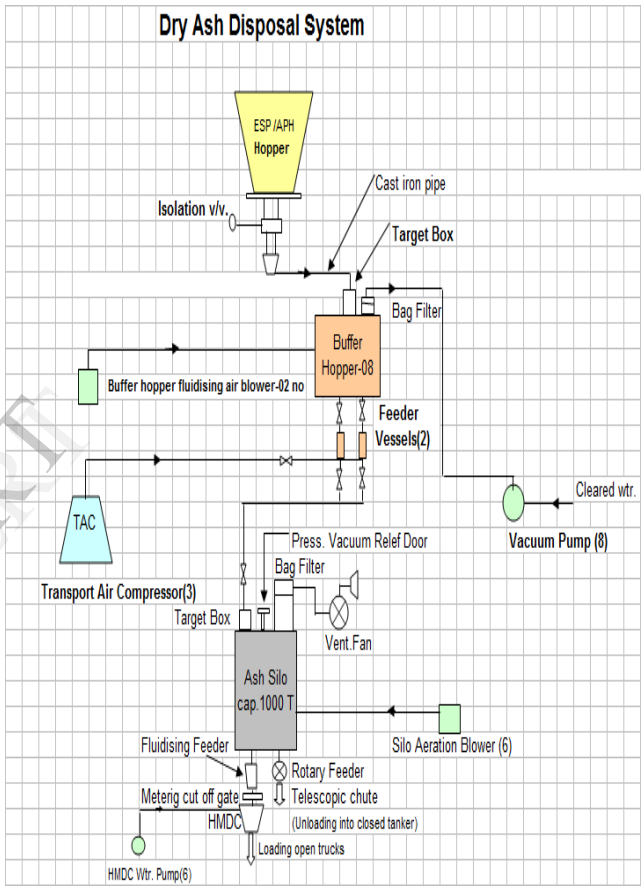
Abstract **- Thermal Power Plants using coal is chief source of energy in our country and it is likely to remain so innear future. The total production of fly ash per annum has already crossed 100 million tones and the disposal of the fly ash is causing several challenges. Utilization of fly ash has picked up but till the percentage utilization is far below satisfaction and power plants are no option but to dispose the fly ash in ash pond. High concentration fly ash slurry is the fly ash disposal system that is followed in many coal based thermal power in India. Efforts to reduce the dilution of the slurry will result in energy conservation as well as water conservation. The latter is even more important to overcome the problem of excess water consumption.**

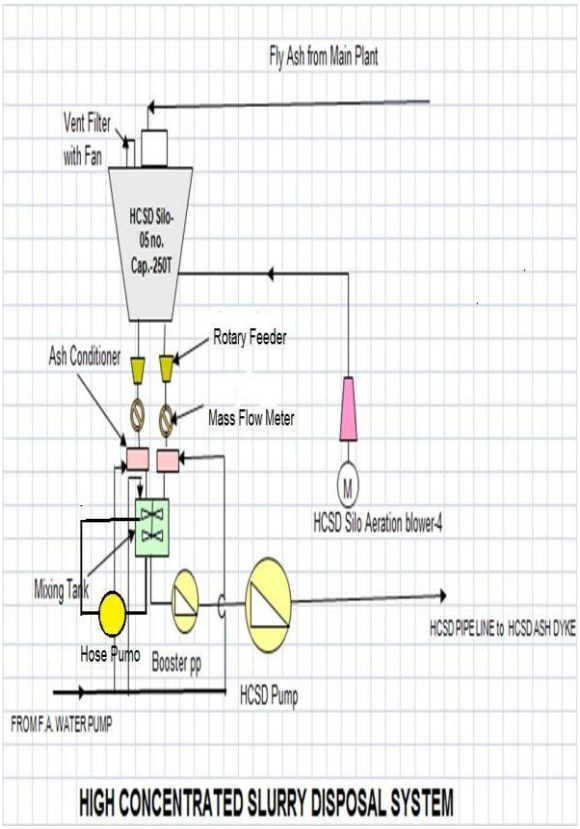
Keyword- **Fly ash, slurry concentration, power plant, ash disposal,**

INTRODUCTION

Coal fired electricity generating plants produce massive amounts of ash as a waste product of combination. In a pulverized coal unit three kinds of ash are produced. Bottom ash, economizer ash, and fly ash. Bottom ash is the reside that accumulates at the bottom of the furnace. Economizer in hoppers ash accumulates in hoppers under the economizer section of the boiler. Fly ash is carried in the flue gas stream. A typical breakdown is 20% bottom ash, 4% economizer ash , and 76% fly ash. The amount of ash produced is directly related to the amount of inert material present in the fuel and quantity of fuel burned.



Economizer and fly ash is generally collected from the flue gas in mechanical separators or electrostatic precipitators in a dry form Economizer and fly ash can either be wet sluiced or pneumatically blown to a final or intermediate disposal point.Lean phase fly ash slurry disposal systems have been in operation for many years in power stations throughout India. Recent advances in high concentration fly ash slurry pumping systems offer advantages for ash disposal systems by virtue of reducing land and water utilization, and by reducing capital and operating costs.



ADVANTAGES OF HCSD SYSTEM

High concentration slurry disposal system (HCSD system)has more objectives such as:

Ecological

1. Water consumption: high concentration ash slurries use up to a factor 12 less water than dilute slurries.
2. No or minimal contamination by water leaking to the environment.
3. Pipeline transportation is safe, silent and reliable without ash spills.
4. No or minimal run-off water and water reclaim system capacity.
5. Thickened ash is not subject to run-out.
6. Dusting is substantially reduced.
7. Slurry hardens out allowing rehabilitation

Operational

1. Slurry spreads over area due to gravitation. No mechanical spreading or operator intervention required.
2. No return water system.
3. Pipeline scaling eliminated.
4. High availability, low parts usage, low maintenance.

Economical

1. Substantial energy savings to run system.
2. The volumes transported are smaller and pipeline sizes can be reduced by more than 50%.
3. By discharging from a central ramp or side-hill, it is possible to avoid raising perimeter dams altogether.
4. The self-draining, sloping (2-6%) deposit offers long-term stability and can be reclaimed progressively at minimum cost.
5. Significant cost savings in disposal area and dyke construction of up to 60%.
6. Method allows for the creation of small ‘hills’ by stacking the disposed ash.
7. Extending life time of existing landfill area under restricted slurry conditions.

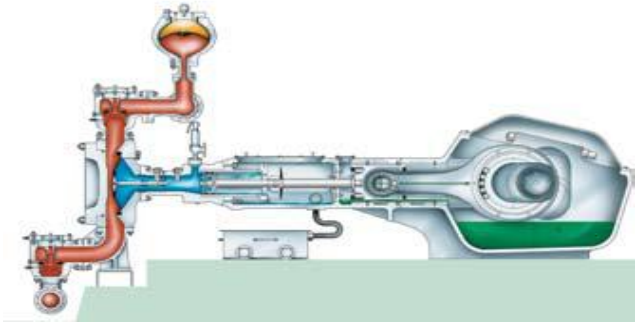
DISADVANTAGES OF HCSD SYSTEM

1. High capital cost due to the fact that special purpose pumps are required.

2. Very strict quality control on all the processparameters is required to ensure trouble free working of the system.

DESCRIPTION OF PUMP

Crankshaft driven piston diaphragm pump



The principal difference between a piston and a piston diaphragm pump is the genuine diaphragm that protects the piston and liner from the sliding contact with the abrasive slurry. The diaphragm is a pre-mounded design that eliminates elongation of the elastomer. Its long fatigue life

allows for routine annual maintenance to be carried out. The diaphragm position is controlled in either direction of the stroke by adding or removing propelling fluid that fills the cavity between the piston and diaphragm. A guide rod connects to an insert and enables the positioncontrol.

DATA SHEET HCSD PUMP MODEL NO. ZPM 800 (GEHO Nederland)

Pump type	2 cylinder, double acting, crankshaft driven piston diaphragm
Liquid to be pumped	High concentration slurry of fly ash
Solid in slurry	Norm 65% w/w, Max 70% w/w
Specific slurry gravity	1538
Max solid dia.	3mm
Slurry temperature	Max 60 0C
Slurry flow rate	Max 257m3/h
Discharge pressure	Max 3700kPa
Suction Pressure	Max. 600 kPa (By of Booster Pump)
NPSH required	212kPA
Pump Power end ratio	5,087
Pump stroke length	3048mm
Number of pistons	2
Piston diameter	280mm
Piston rod diameter	60mm
Pump volume efficiency	at max duty 95%
Pump mech/hydr. Efficiency	at max efficiency 93%
Power at pump shaft	284 kW
Diaphragm Size	265 ltr.
Dampener size	1x 150/64
Suction Air Vessel Size	2 x 260 ltr

SUMMARY

One of the major challenges in ash disposal is to protectthe environment. To manage safe disposal and conform tothe stipulations it is necessary to have properPlanning, studies/ investigations, method of disposal atdesign stage, implementation stage, and management ofsafe disposal during operating and non-operating stage.
Based on the technology scan and visits/discussionswith experts/utilities/manufacturers it is gathered thatHCSD has several advantages compared to other disposalmethods.

This paper highlights important issues related to HCSD System Most of the observations are based on experience at various power plant.

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