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Coal Combustion Residuals – Waste Pond Replacement

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DWN: RCS DATE:



WesTech's **Horizontal Vacuum Belt Filter** is a continuous vacuum filter unit operating on a horizontal plane. Slurries are fed from above onto a filter cloth supported by a traveling drainage belt. The unit utilizes both vacuum and gravity to effect rapid separation of liquids and solids. A full range of slurries from coarse granular materials to fine slimes can be filtered. The horizontal belt filter is especially adaptable to the process flow sheet for applications where low cake moisture and multistage or countercurrent cake washing is desirable.

Coal Combustion Residuals (CCR) Waste Pond Replacement

In the wake of dike failures on retention ponds and in the face of new legislation, many coal-fired power plants are opting to eliminate all waste storage ponds. These ponds are mainly for the storage of coal combustion residuals which include gypsum, fly ash, and bottom ash.

This process is further complicated by the fact that pending EPA classification may deem fly ash and bottom ash as hazardous materials. Therefore, some utilities have opted to keep their non-toxic gypsum streams and potentially toxic coal ash streams isolated from one another. This strategy also makes sense if one is going to sell the dewatered gypsum to the wallboard market.

Gypsum

The major process steps for gypsum recovery are:

A. Hydrocyclones

The first step in this process is to send the gypsum stream to a bank of hydrocyclones. Here the solids are separated by means of centrifugal force. The hydrocyclone underflow containing the majority of the solids flows to the sludge mixing tank. The hydrocyclone overflow goes to the thickeners. If this were not done, the percent solids in the thickener underflow would be too great to pump the sludge to the belt filters. Removal of these solids and associated liquid also allows the thickeners to be smaller in diameter, saving valuable real estate and reducing capital expenses.

B. Thickeners

The thickeners receive the overflow from the hydrocyclones as well as the filtrate returned from the horizontal vacuum belt filters. Polymer is added

to facilitate thickening in addition to caustic if pH adjustment is required. The sludge is pumped to the sludge mix tank and combined with the underflow from the hydrocyclones. In this application, the thickeners have a dual role of not only settling and thickening solids, but also of clarifying the wastewater stream prior to its discharge. The solids level in this stream must meet the discharge limits of the power plant. This treatment process does not remove heavy metals.

C. Horizontal Vacuum Belt Filters

The combined gypsum sludge streams are mixed and then sent to horizontal vacuum belt filters. Typically gypsum for disposal has a moisture level of 15%. Gypsum for wallboard use has a final moisture level of less than 10%. The filtrate from this dewatering step is returned to the thickeners.

Bottom Ash and Fly Ash

Due to the concern for cross-contamination of either the liquid streams or the residual solids, the ash streams are kept separate from the gypsum stream.

A. Thickeners

The nature and amount of stream solids do not require hydrocyclone treatment, so thickeners are the first step in the ash handling system. Polymer addition promotes solids settling and creates a liquid stream suitable for recycling to the ash handling system.

B. Rotary Vacuum Drum Filters

The nature of the ash solids allows dewatering by rotary vacuum drum filters. This saves in capital and installation costs as well as the installation area required. This processed ash contains approximately 15% moisture. It is suitable for sale or landfill disposal.