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The **Solids CONTACT CLARIFIER™** is a mixture of old art and new process technology. Patent art dates back to the 1880's and contemporary solids contact clarifier units have their origins in the 1940's and 1950's. The two most common applications of the Solids CONTACT CLARIFIER™ are cold lime softening, where the unit is used to maximize the rate of chemical precipitation, and surface water clarification, where the unit is used as an enhanced flocculation device.

## Bottom Ash Pond Replacement

When coal is burned, two major forms of ash are produced. The fly ash is light and leaves the furnace with hot gases. The bottom ash is heavy and stays in the furnace until it is scraped out. Due to potential liability issues and/or the need to find new real estate at power plants for expansion, many utilities must replace their traditional bottom ash ponds. Utilities using traditional hydro bins can accomplish this by installing a system using solids contact clarifiers and dewatering equipment.

## Equalization

In addition, ash ponds have been used in power plants to handle the many and varied waste streams which are produced. The use of a mixed equalization tank produces a somewhat uniform influent stream which can be processed by the solids contact clarifiers.

## Solids Contact Clarifiers

Hydro bins coupled with gravity sedimentation are used to recover most of the water from the bottom ash handling system. The solids contact clarifier uses a sludge bed and recycling of the solids internally to build up and maintain an internal solids concentration which removes fine materials. The addition of lime slurry to this stream can also remove any oils and/or heavy metals which may cause problems for discharging the stream.

This system with lime addition can process the many and varied plant waste streams which are traditionally sent to the bottom ash pond. Since the solids contact clarifier has an internal recycle stream which is approximately 10 times the maximum influent flow and hundreds of times more solids than the influent stream, it can absorb the variations produced by the influent streams, including amount of solids and temperature. If the pH is raised above

11, there will be precipitation of heavy metals in the hydroxide form. This water must then be neutralized. Water from the system can be recycled to the bottom ash handling system or used in other parts of the plant, such as cooling tower makeup, wash down water, or dust control.

## Thickener

The sludge from the solids contact clarifier is sent to a thickener. By removing excess water at this stage in the process, it allows the dewatering equipment to be smaller and more economical. In this process, with the addition of lime, the sludge would enter the thickener at approximately 3–5% solids and be thickened to > 10% solids. The thickener can also be sized and used to handle other sludges produced in the power plant if it is desirable that those sludges would be dewatered also. The lime in this sludge will aid in the thickening of other sludges which otherwise might not thicken. The lime will also help these combined sludges be in such a consistency that they will dewater well.

## Dewatering

Belt presses are used in the dewatering step. The belt press uses two parallel cloth belts pressed between a series of rollers to squeeze the moisture from the solids. Belt presses offer the advantage of continuous operation and minimum operator attention.

Once the chemical addition has been adjusted, the dewatering process can be monitored from the control room by means of closed-circuit television. Other options for dewatering include filter presses. In either case, lime sludges tend to dewater well and produce relatively dry cakes.

The water from the dewatering step is returned to the clarifier for retreatment through the system.