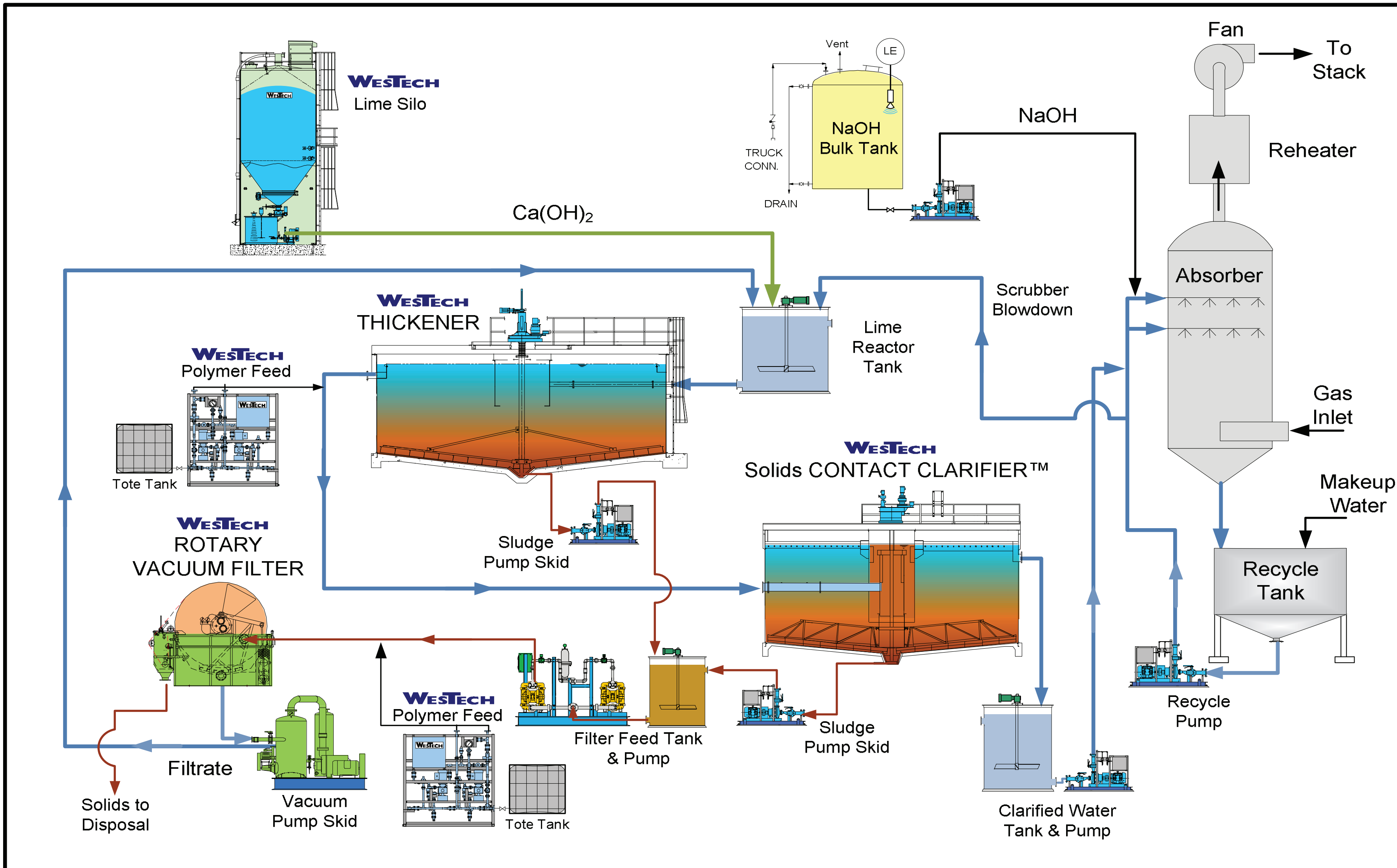

Dual Alkali Scrubber System

WesTech

DWN: RCS DATE:

The ***EvenFlo™ Feedwell*** from WesTech represents the latest advancement in feedwell technology. A properly designed feedwell should provide energy dissipation as well as even distribution of the feed into the thickener. WesTech's EvenFlow design consists of a two part feedwell system. An inner chamber coverts the feed energy into a concentric radial flow. The main feedwell chamber then evenly distributes the feed into the sedimentation zone of the thickener. The result is an efficient, low cost, high rate thickener with a clear effluent.

Dual Alkali Scrubber Wastewater Treatment

Sulfur in the coal is converted to sulfur dioxide (SO_2) when the coal is burned. If the SO_2 is left in the stack gas, it will react with water in the air to form sulfuric acid. This acid is the main cause of acid rain. Sulfur removal from the stack gases has been required since the late 1970s. Scrubbers are one way to remove the sulfur from the stack gas.

The dual alkali design of scrubbing flue gas has been widely used since the early 1980s. As the name implies, two alkalis (sodium and calcium) are used to capture sulfur dioxide (SO_2). This employs an indirect lime process for removing acid from the gas with a sodium-based absorbent.

The sorbent liquor is regenerated with a zero liquid discharge (ZLD) system and is recycled back to the scrubber. Depending on the size of the system, the sodium-based absorbent is most commonly either caustic (NaOH) or soda ash ($Na2CO_3$). Sodium-based alkalis improve mass transfer rate when compared to calcium-based reagents.

Reducing Airborne Pollutants

This process can be effective and economical to reduce SO_2 and other airborne pollutant emissions from process plants such as ore smelters, chemical plants, refineries, paper mills, cogeneration boilers, and hazardous waste incinerators. Operating costs prevent wider use on utility boilers and other larger applications. Gypsum is not a byproduct of this process. Smaller applications often use NaOH as the sodium alkali source.

A concentrated dual alkali system may also be used when flue gas sulfur levels vary widely (0.5 – 6%). This absorbent solution concentration does not precipitate gypsum during the absorbent regeneration. The system operates in an unsaturated state with respect to gypsum. A concentrated mode dual alkali plant dissolves sulfur dioxide yielding mostly $NaHSO_3$ as a product.

Lime Reactor Tank

The solution from this absorber section is pumped to the lime reactor tank for regeneration. Slaked lime ($Ca(OH)_2$) is added to increase the pH and precipitate $CaSO_3$. $NaHSO_3$ reacts to regenerate NaOH and Na_2SO_3. Filtrate from the vacuum dewatering filter is also returned to this tank. Sulfates in the system form $CaSO_4$. The final product from the dual alkali plant is a mixture of $CaSO_3$ and $CaSO_4$ in an 80/20 ratio.

Lime reactor tank effluent flows through a two stage clarification process consisting of a HiFlo™ High Rate Thickener and a Solids CONTACT CLARIFIER™. Solids are removed and all reactions are taken to completion. Sludge from these units is combined in a sludge holding tank then fed to the dewatering system.

The mixture of $CaSO_3$ and $CaSO_4$ is filtered using a rotary vacuum drum filter to a moisture content of 30% to 40%. Caustic or soda ash feed replenishes sodium lost in the filter cake. Lime slurry replenishes calcium lost in sludge formation.