AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

APPLICATION PROFILE

APPLICATION
FLUE GAS DESULFURIZATION EFFLUENT

INDUSTRY
POWER AND ENERGY

AQUA-AEROBIC SOLUTION
Aqua-Aerobic® CLOTH MEDIA FILTRATION

FILTER INSTALLATIONS REMOVE SOLIDS FROM FGD SCRUBBER EFFLUENT

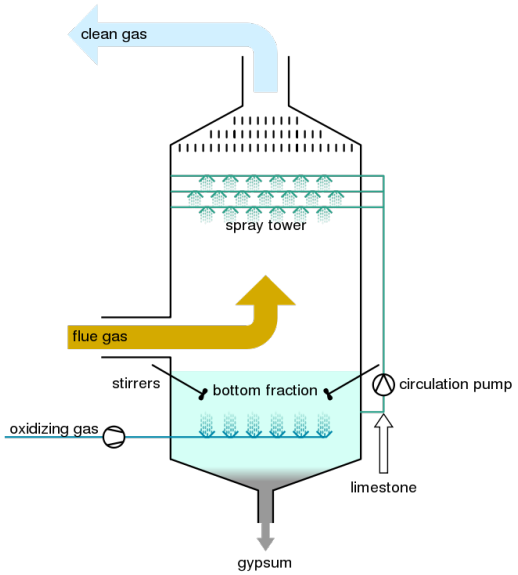
The Challenge

Power plants and refineries around the world must manage and treat complex effluent waste streams from the Flue Gas Desulfurization (FGD) process. Flue gas is generated by the combustion process of fossil and fossil-derived fuels, such as coal, oils, and natural gas in power plants. Petrochemical refineries may generate flue gas from a number of different processes, including Catalytic Cracking, Steam Methane Reforming, and Heaters or Furnaces.

Power Plant Industrial Chimney

Flue gasses contain a high amount of sulfur oxides (SOx), which should be removed. Sulfur dioxide in the atmosphere can cause health problems in humans and wildlife, while also damaging vegetation. The common denominator to both power plant and refinery industries is that flue gas will go through a treatment step to remove sulfur, known as desulfurization. Flue gas desulfurization is typically performed by wet scrubbing, which can achieve as much as 90% SOx removal. Less common methods include dry scrubbing and dry sorbant injection.

The desulfurization produces complex effluents, requiring treatment before introduction to the wastewater process. Wet FGD scrubbers are either recirculating or once-through systems.



Flue Gas Desulfurization (FGD) Unit

Both types of scrubbers generate effluents with high solids that exceed wastewater treatment capabilities. The blowdown stream or purge from a recirculating system can be recycled or sent to wastewater treatment after solids reduction.

This FGD effluent after the desulfurization process contains solids (dissolved and suspended), a wide range of heavy metals, and other water quality constituents including, but not limited to, Ammonia, Total Nitrogen, Chemical Oxygen Demand, Chloride and Sulfate.

The Solution

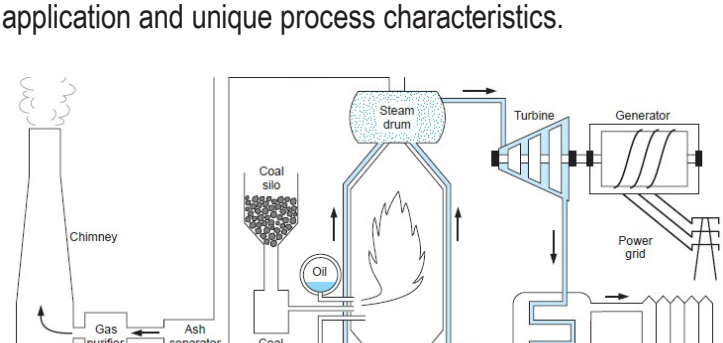
There are several options to remove suspended solids from the FGD scrubber effluent stream, which depend upon the FGD system and engineered process. These FGD effluent solids contain Total Suspended Solids (TSS) concentrations up to 7%. Reduction is often accomplished in steps – clarification or solids settling, and filtration. Some FGD package systems offer a compact clarifier, but other methods can be employed.

The Proven Result

Aqua-Aerobic Systems, Inc. has installations in operation to remove TSS from FGD scrubber discharge. The Aqua-Aerobic® cloth media filter featuring OptiFiber® media is available in a number of configurations, including the AquaDisk®, Aqua MegaDisk®, and AquaPrime®.

AquaDisk® Cloth Media Filters with OptiFiber PES-14® Pile Cloth Media

These equipment designs are highly effective methods of removing TSS prior to additional tertiary treatment and/or discharge. The appropriate model recommended is based upon hydraulic conditions, loadings, and available footprint. Depending upon the water chemistry and particle size distribution, a coagulant and flocculant may be employed to enhance precipitation and agglomeration of particles. Many applications do not require chemical addition. The most suitable technology can be designed and optimized for your application and unique process characteristics.



A Typical Steam Turbine Flow Schematic

Credit: ME Mechanical (2016). Retrieved from https://me mechanicalengineering.com/simple-steam-power-plant/

AquaDisk® FILTER ADVANTAGES

- Utilizes engineered OptiFiber® cloth filtration media
- Produces consistent, reuse-quality effluent
- Backwash system fluidizes fibers for efficient release of stored solids
- Tolerates extreme variations in load
- Vertically oriented disks reduce required footprint
- Lightweight, removable disk segments for ease of maintenance
- Low backwash volume results in water savings and energy reduction
- Available in painted steel, stainless steel or concrete tanks
- Eliminates sand media and underdrains
- Low effluent TSS and NTU for industrial cooling used in power plants, petroleum refineries, food processing, and other industrial facilities