FLUE GAS DESULFURIZATION
WASTEWATER TREATMENT
CORPORATE OVERVIEW

Every day, millions of people and thousands of companies rely on Evoqua Water Technologies to meet their water and wastewater needs. Whether it’s treatment for municipalities or private industries, Evoqua provides treatment systems and solutions to meet specific application requirements.

Our mission is to provide single-source water and wastewater treatment solutions through cost-effective treatment technologies and superior customer service. Every system is designed by our process experts and value engineered to ensure the required performance targets are achieved or exceeded, while staying within budget and on schedule. All projects are designed for quality, safety, and compliance.

Evoqua Water Technologies has established itself as a market leader by delivering cost-effective, reliable wastewater treatment systems and services to customers with new and retrofit flue gas desulfurization (FGD) wastewater treatment projects. Our team of experts is comprised of engineers and project managers with many years of experience in the power industry and with FGD projects. We provide fully-integrated, single-source solutions by offering a complete range of services including:

- Application and Design Engineering
- Treatability and Pilot Testing
- Equipment Manufacturing
- Project Management
- Commissioning
- Performance Warranties
- Operator Training
- Operations and Maintenance Services

Depending on the wastewater characteristics we provide physical, chemical, and/or advanced reactive media process for the removal of total suspended solids, heavy metals, nitrates, organics, and other contaminants from FGD purge streams. The delivery of cost-effective, reliable systems is just the start. Our disciplined project management model and rigorous execution protocols ensure that your system will be delivered, installed, and commissioned on time and within budget.

Evoqua Water Technologies is focused on providing comprehensive, safe solutions. Our financial strength, broad product resources, and collective experience are your assurance of our commitment to you and your environmental requirements.

Why Evoqua Water Technologies?

- Innovative solutions based on proven technologies
- Extensive process expertise
- Comprehensive, integrated design/supply
- Clearly defined scope – no surprises
- Rigorous project execution
- All major components from one supplier means schedule and QA/QC are controlled
- Most comprehensive water technology portfolio in the world
- R&D laboratory to support existing operating systems and to develop innovative solutions for meeting future requirements
- Capability to finance, build, own, operate the wastewater treatment system
- Local service and parts when and where you need them
FLUE GAS DESULFURIZATION (FGD) WASTEWATER: BACKGROUND

Although many forms of alternative energies are being developed, and nuclear power production is coming back, studies indicate that coal will continue to be a substantial source of electricity production in the world for some time.

New coal-fired power plants are being built, especially in fast-growing Asia, and existing coal fired power plants in the U.S. are expected to be retrofitted for environmental compliance. One feature becoming more and more common with these new plants and existing plants is the treatment of priority pollutants (sulfur dioxides, nitrogen dioxides, particulates, carbon monoxide, and others). Additionally, many existing power plants are being retrofitted to remove these pollutants.

In particular, FGD systems for SOx removal are being installed for tens of thousands of megawatts of coal-fired capacity in the United States. According to the EPA estimated compliance cost for US power plants discharging FGD wastewater is anywhere between 2.5 and 6.0 billion USD.

FLUE GAS DESULFURIZATION (FGD) WASTEWATER PROCESS

One of the most commonly used FGD technologies for scrubbing pollutants from power plant gas emissions is a limestone forced oxidation (LSFO) scrubber system. In this process, many pollutants end up in the circulating water in the scrubber. To maintain appropriate operating conditions, a constant purge stream is discharged from the scrubber system, and the purge stream contains contaminants from coal, limestone, and make-up water. The purge is acidic and supersaturated with gypsum, with high concentrations of TDS, TSS, heavy metals, chlorides and occasionally, dissolved organic compounds.

State and Federal laws regulate the concentration of pollutants in FGD wastewater prior to discharge to waterways. In some cases (e.g., power plants discharging to large rivers), the wastewater may be suitable for discharge after minor treatment for suspended solids and pH adjustment. However, in many cases, the wastewater requires treatment for the reduction of key contaminants, including suspended solids, COD/BOD, total nitrates, and selected heavy metals to very low concentrations.

The scrubber purge stream is most often treated in a dedicated wastewater facility rather than an existing treatment system, for the following reasons:

- The power plant’s existing wastewater treatment facility may not have adequate capacity.
- The materials of construction of the existing treatment facility most likely are unsuitable for receiving a high chloride stream.
- The treatment facility’s process design may not be appropriate for the very strict wastewater discharge limits likely to be enforced for the FGD wastewater.

FGD wastewater composition can vary significantly from plant to plant. Quantity and quality is affected by the rated capacity of the boiler, scrubber chloride concentrations, efficiency of the fly ash removal, the type and efficiency of the gypsum dewatering system, the type of FGD process used, and the composition of coal, limestone and make-up water.
THE TREATMENT SOLUTION

FGD effluent from a LSFO type scrubber typically comes from the overflow of a secondary hydrocyclone in the gypsum dewatering system and is directed to the equalization tank of the wastewater treatment system.

The FGD wastewater treatment system by Evoqua Water Technologies is a physical/chemical system specifically designed to de-saturate the effluent, precipitate heavy metals, and reduce suspended solids by flocculation, settling and dewatering. After treatment, the contaminants are discharged as a solids cake for final disposal in a landfill. The treated wastewater is discharged to a receiving body of water, or it may be polished with a continuous backwash gravity filter to further reduce suspended solids prior to discharge.

In some cases, additional treatment may be necessary if lower levels of selenium or nitrates are required.

All of the treatment steps in our process are based on proven technology, in operation throughout the world, in similar applications. Evoqua Water Technologies uses our extensive experience to design a customer specific solution for each specific plant’s characteristics, while maintaining the flexibility to meet changing future conditions resulting from variations in coal burned, limestone used, and process water consumed.
OUR FGD WASTEWATER TREATMENT SYSTEM IS COMPRISED OF SEVERAL KEY STEPS.

The equalization tank provides an equalizing effect to smooth out spikes in flow rates and contaminant concentrations.

Effluent flows by gravity to Reaction Tank #1 in which alkali (generally hydrated lime) is added to desaturate the wastewater to prevent scaling of downstream equipment. Some heavy metals will precipitate as hydroxides. Organo sulfide is also added to this tank to cause additional precipitation of heavy metals to concentrations lower than achievable by alkali precipitation alone.

Wastewater flows to Reaction Tank #2 in which ferric chloride is added to cause flocculation of the suspended solids.

Polymer is then added via an in-line mixer in the pipe leading to the clarifier or directly to the clarifier to increase the coagulation of the solids for optimum solids/liquid separation in the clarifier.

Solids are extracted from the underflow of the clarifier and go to a sludge tank prior to being processed in the dewatering unit. A solids cake discharges from the dewatering unit into trucks, bins, or a holding sump on the floor, prior to disposal in a landfill.

Overflow from the clarifier is adjusted for pH, and is either discharged to the receiving body of water, to plant holding ponds, or to other treatment processes, as necessary.
A lot can be said by the company one keeps. Evoqua Water Technologies serves a wide range of utilities in the United States with FGD wastewater treatment systems designed, supplied – and in some cases installed – by our experts.

By the very nature of coal burned in different parts of the country, its sulfur content, and the environmental requirements that exist in certain regions, the majority of wet FGD systems will be found east of the Mississippi River. Specific wastewater treatment requirements will also be determined by a plant’s makeup water source, the discharging body of water, the type of scrubber, the chemistry of the coal/water/limestone, and any unique permit requirements from the state.

Evoqua Water Technologies has the experience and track record to provide proven treatment technologies customized to individual plant needs to accommodate various chemistries and flow rates.
SERVICES

OPERATIONS AND MAINTENANCE SERVICES FROM EVOQUA WATER TECHNOLOGIES

Since FGD wastewater treatment systems are significantly different from standard power plant water or wastewater treatment systems, utilities may opt to contract with Evoqua Water Technologies for operation and maintenance services. Sometimes the utility does not want to add staff, but would prefer to contract for a complete O&M service package, from our dedicated and highly experienced O&M group, to ensure superior operation by people experienced in the specifics of the FGD wastewater treatment plant. Additionally, the O&M service will be provided by the company that designed and supplied the system, and will be backed by a performance guarantee.

We have a dedicated group of service personnel with extensive experience in providing O&M services for our systems in many areas of application, including simple and complex O&M service, lease services, consulting, rental, temporary and long-term O&M contracts. Contact us today to discuss your situation and how our O&M programs can help you.

Consider outsourcing your water treatment operations to:

- Focus on your core business
- Improve your manpower utilization
- Mitigate your operating risk
- Reduce your operating costs
- Partner with a water expert

A FINAL WORD ON VALUE

Cost-effective solutions are neither expensive nor inexpensive. Often, an inexpensive initial solution can lead to very high life cycle costs. Challenging projects such as FGD wastewater treatment deserve proven solutions by skilled and experienced people. Our team at Evoqua Water Technologies is committed to meet your wastewater treatment needs.
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