How To Combat Coal Ash In Power Plant Wastewater Streams

Unbeknownst to many, coal ash is one of the most prolific industrial wastes affecting wastewater quality in the country, with more than 100 hundred million tons produced each year. And treating for the byproduct is paramount, with health concerns and stringent regulations in place governing its removal.

To get an idea of possible removal options for coal ash to keep the contaminant out of water supplies, Water Online spoke with Amiad Water Systems. We asked about federal guidelines, different treatment approaches, and how operations can determine the best technology for their needs.

**What is coal ash? Where does it come from?**
Coal ash is a residual from the process of burning coal, primarily from coal-fired power plants. This includes: fly ash, produced when the ground coal is burned in the boiler; bottom ash, coarse ash too large to be carried into smokestacks which collects on the bottom of the boiler; slag, molten bottom ash; and flue gas desulfurization (FGD) material, material collected in the emissions control devices on exhaust lines.

The ash is collected from the boiler and/or collected from the FGD system and disposed of in a landfill, or it is conveyed out of the plant by a water stream.

**How does coal ash threaten water quality?**
The U.S. EPA has found that coal ash is a significant threat to water quality. Large spills in the past, including incidents in Tennessee and North Carolina, have highlighted the need for federal action to ensure protective coal ash disposal and proper treatment of wastewater before permitted disposal.

"Coal ash contains contaminants like mercury, cadmium, and arsenic," according to the EPA. “Without proper management, these contaminants can pollute waterways, groundwater, drinking water, and the air.”

These contaminants present acute health risks if present in water supplies and consumed.

**Can you share any statistics or anecdotes that demonstrate the breadth of coal ash contamination?**
Coal ash is one of the largest types of industrial waste generated in the United States. According to the American Coal Ash Association’s Coal Combustion Product Production & Use Survey Report, nearly 130 million tons of coal ash was generated in 2014.
As referenced above, two significant coal ash spills have prompted a great deal of focus on EPA regulation. In 2008, the side of a dike used to contain coal ash gave way, and about 5.4 million cubic yards of coal ash were released into source water. In 2014, 39,000 tons of coal ash spilled into a river, requiring a local and federal response.

Why can it be a challenge for operations to contain it?
The coal ash contains small, light particles that are difficult to contain, control, and then remove for disposal. If a power plant uses water stream conveyance, the water with the ash is sent into a series of sedimentation ponds where coagulant is added to the water to help the larger coal ash solids settle. The residual water will still carry small amounts of coal ash that is too light to settle, and removal of this residual coal ash is tricky.

What regulations exist around coal ash, and how do these burden the operations that are responsible for treating it?
The EPA has made its regulations available online. It establishes technical requirements for coal ash landfills and surface impoundments. The goals of the regulations are to address risks in coal ash disposal, including leaks into groundwater, dispersal of dry ash into the air, and catastrophic failures like those previously discussed.

Each power plant will also have to meet permitted discharge limits for their wastewater streams, and if coal ash contaminates the wastewater stream, this will have to be a focus of the wastewater stream treatment.

What are the treatment/prevention options available for wastewater contaminated by coal ash?
Water from the sedimentation ponds must be treated with coagulants for settling and then filtered to remove the remaining suspended solids. Each wastewater stream must be analyzed to determine the suspended and dissolved solids in the water, and a treatment plan must be put in place to remove the contaminants of concern to meet the local and federal discharge requirements for disposal into local waterways. Treatment will likely include technology such as particle filtration, chemical treatment, and membrane filtration.

What has Amiad Water Systems learned from its experiences providing filtering technology for coal ash treatment that might help other operations?
Separating coal ash from water is a tricky process, and each site will be different and have specific needs. A solution provider must try different options by running pilots for several months before finalizing the solution. Since Amiad has the ability to offer several filtration technologies, we are able to test different filter options and configurations to find the best fit for several different sites.

When is filtering a preferable treatment option for coal ash in wastewater?
Some type of filtration will always be necessary to remove unsettleable solids when a plant is using large settling ponds and coagulants. The goal of the first stage of filtration is to reach a high level of fine treatment to remove as much of the suspended solids as possible and then follow with a treatment option to address dissolved contaminants, salts, and minerals with something like a membrane system, such as reverse osmosis (RO). The filtration system will efficiently remove the suspended solids and will protect the downstream equipment, allowing it to perform more efficiently and effectively.

What filtering options are available, and how should an operator evaluate which one will be the best fit?
Each site will require a different treatment train. An operator needs to understand what is in the wastewater to be treated by performing analyses and evaluating how contamination fluctuates over time (depending upon plant production, environmental changes, etc.). Once the operator has an idea of what solids and contaminants need to be removed from their wastewater stream to meet discharge permit regulations, then they can begin searching for the best technologies.

The filtration stage of the treatment train can include one type of filter or staged filtration to remove solids. This can include centrifugal filtration, media filtration, and self-cleaning screen or disc filtration. The operator must evaluate which technology can reach the micron rating required for solids removal, the ability of the filter system to handle the solids loading in the wastewater stream, filter materials of construction, water and energy efficiency, and the manufacturer’s experience providing filtration for these systems.