



# In the Stream

## Consol Energy—Knight AMD Treatment Facility

### Acid Mine Drainage—1700 gpm CONSOL Energy—. Mannington, WV

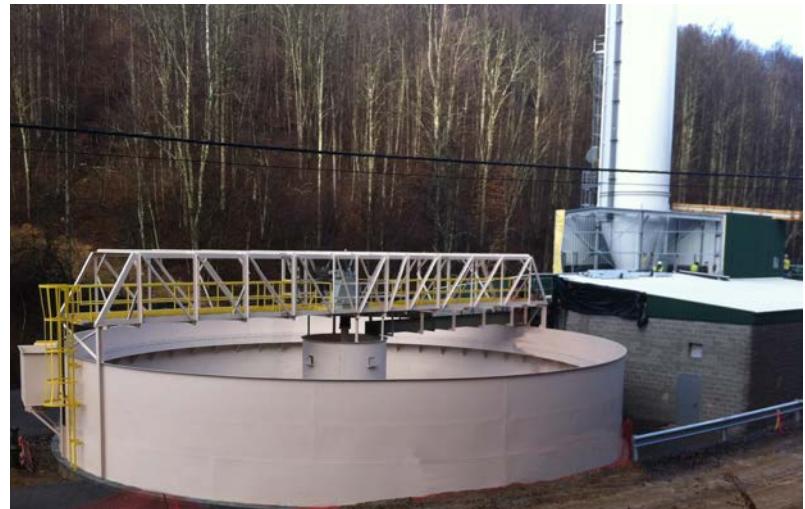
This treatment system is a classic High Density Sludge (HDS) system. The raw water is first aerated to reduce the CO<sub>2</sub> content. This has the effect of raising the pH which may sometimes be as low as 2 pH. The addition of oxygen from this mixing oxidizes the dissolved iron to a state where it comes out of solution.

A mixture of recycled sludge which has been conditioned with fresh lime is added to the stream. This creates a sludge with a higher density that is easily settled. Polymer is added to aid in floc formation. This slurry also raises the pH of the stream.

This stream is then directed to the thickener where the solids settle. The effluent from the thickener in many cases may contain as little as 10 PPM of solids and be suitable for direct discharge.

The ClearStream 70' dia Thickener with lift design includes pickets on the rake arms to further enhance the thickening of the sludge by creating "channels" which allow the water to be released from the sludge blanket. The lift mechanism automatically raises the rake if high torque events are encountered and activates an alarm to alert the operator.

The settled sludge is then pumped from the thickener. A portion of the sludge is recycled to the HDS tank. In this tank lime slurry is added to the sludge and the mixture is returned to the head of the process. The remainder of the sludge is pumped to disposal, normally an abandoned portion of the mine.



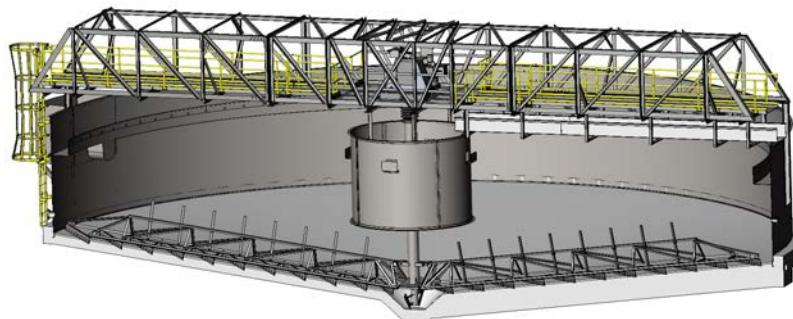
**Pickets on the Rakes**

ClearStream produces a 3D model of every unit which we manufacture. These models are extremely valuable to ensure proper fit up.

In addition, these models can be a useful tool for operator training and understanding of the unit design and operation.



**Shaft Drive with Lift**



**3D Model of 70' Dia ClearStream Thickener**

ClearStream offers a complete line of equipment for municipal, industrial, power, and mining water and wastewater applications.

## **Headworks**

Titan Detritors™ Grit Removal

## **Sedimentation Equipment**

Segmented Rake, Plow Style

Spiral Blade Design

Suction Header Clarifiers

Suction Pipe Clarifiers

Solids Contact Clarifiers

RapidStream™ - High-rate Solids Contact  
Clarifier / Thickeners

Rim Drive Clarifiers

Thickeners

## **DAF Units**

Circular

Rectangular

## **CPI Type Oil/Water Separators**

Rectangular

Packaged

## **API Type Oil/Water Separators**

Rectangular

Circular

## **Walnut Shell Filters**

Standard

Custom

## **Anaerobic Digester Covers**

Buoyant Truss Steel Covers

Gasholder Truss Steel Covers

Radial Beam Fixed Steel Covers

Radial Beam Gasholder Steel Covers

Dual Membrane Gasholder Covers  
(Tank Mounted / Slab Mounted)

## **Biological Process Equipment**

ClearFlo™ Jet Aeration Systems

ClearFlo™ Bullseye Oxidation Channel™

ClearFlo™ Sequencing Batch Reactors

ClearFlo™ Continuous Loop Reactors

ClearFlo™ DitchDr™ Optimization  
/ Retrofits

## **Trickling Filters**

Mechanically Driven Distributor Arms

Hydraulically Driven Distributor Arms

## **PRE™ Heavy Duty Drives (New and Replacement)**

Column Mounted Cage Drives

Bridge Mounted Shaft Drives

Dual Cage Drives

Dual Shaft Drives

Cage Drives with Lifts

Shaft Drives with Lifts

Multi-Pinion Cage Drives

Multi-Pinion Shaft Drives

Direct Cage Drives

Direct Shaft Drives

Hydraulic Drives

Rim Drives

## **Field Service and Training**

### **Retrofit Service**

### **Tankage and Erection**

### **Process Audits**



Learn More



Water & Wastewater Treatment Solutions

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