Clyde Bergemann Delta Ducon
Bottom Ash Conversion Options
for Ash Pond Removal

McIlvaine Company
Hot Topic Hour
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Many existing coal fired boilers were designed and built with water impounded style bottom ash hoppers.

The ash hopper stores bottom ash that is periodically crushed and evacuated via water driven jet pumps, often to ash ponds for disposal.
Bottom Ash Slurry Systems:

- The bottom ash is transported, in a slurry form to an ash pond.
- The bottom ash is then stored in the ash pond.

Typical Bottom Ash Slurry Piping

Bottom Ash discharged to an ash pond
Plants that are considering eliminating the use of their ash ponds have the following options:

1) *Replace* the bottom ash hopper system with a dry ash conveyor *(DRYCON™)*.

2) *Replace* the bottom ash hopper system with a submerged scraper conveyor *(SSC)*.

3) *Divert* the flow of the existing bottom ash slurry piping to new dewatering bins.

4) *Divert* the flow of the existing bottom ash slurry piping to an *ASHCON™* system.

Clyde Bergemann Delta Ducon can provide and support *ALL* of the above solutions.
Bottom Ash Retrofit Options:

Exploring the OPTIONS! #1

The most efficient method to eliminate the use of their ash ponds is the following:

1) *Replace the bottom ash hopper system with a dry ash conveyor (DRYCON™).*
Benefits Considered for DRYCON™ System

Environmental Protection
- Elimination of *ALL* water usage
- Elimination of water effluent & treatment
- Easiest compliance with environmental protection regulations
- Fully enclosed system

Increased Efficiency
- Reduction of thermal energy losses
- Reduction of unburned carbon
- Increased boiler efficiency
- Reduction in CO₂ emissions

Cost Reduction
- Reduced maintenance costs
- Reduction in materials handling costs
- No water usage
- No water treatment costs

Increased Revenue
- Improved boiler efficiency
- Saleable ash quality
DRYCON™ is a Steel Plate Conveyor

- Closed plate (apron, pan) conveyor
- Small gap between the plates
- Lowest overall height
- Robust and simple design
- Easy assembly and disassembly
- High resistance to temperature
- Ash inlet area is supported by impact tables
Fines re-circulation plate fitted every 6th pan.

Allows for self cleaning of fines accumulation.

The fines re-circulation is integral to the primary conveyor.

Deflector connected to tensioning system.
Cooling Air Flow & Inlets

Controlled Cooling Air Inlet
Impact of Large Slag Falls

The impact of large ash lumps are directed onto Impact Beams, not onto the supporting idlers.

Fixed Impact Beams

Moving Impact Beam

Clearance during normal operation.
Bottom Ash Retrofit Options:

Exploring the OPTIONS! #2

The most efficient method to eliminate the use of their ash ponds is the following:

1) Replace the bottom ash hopper system with a dry ash conveyor (DRYCON™).
2) Replace the bottom ash hopper system with a submerged scraper conveyor (SSC).
SSC Technology

SSC Design Features

- Angle plate provides chain protection and retention
- Bolted flight bar connection for ease of maintenance
- Flight bar with hardened wear strips
- Heavy duty round link chain. Tempered or case hardened
- Manganese Steel liner plate

Still “Wet” Bottom Handling with much less water and much less horsepower
The most efficient method to eliminate the use of their ash ponds is the following:

1) Replace the bottom ash hopper system with a dry ash conveyor (DRYCON™).
2) Replace the bottom ash hopper system with a submerged scraper conveyor (SSC).

- Both of the above options are the best solutions for bottom ash handling. Both involve removal of the existing water impounded bottom ash hopper. However, many existing plant designs do not allow for this type of retrofit. The existing bottom ash hoppers may be located in a pit or basement level and/or surrounded by auxiliary equipment or columns. This can make it difficult or impractical for a DRYCON™ or SSC retrofit.
This photo is an example of a water impounded bottom ash hopper. Located below grade and surrounded by boiler support columns, this unit would be difficult or impossible to retrofit with a DRYCON™ or Submerged Scraper Conveyor (SSC).
When a DRYCON™ or SSC won’t fit:

Exploring the OPTIONS! # 3

- Plants that are considering eliminating the use of their ash ponds have the following options:
  - 1) Replace the bottom ash hopper system with a dry ash conveyor (DRYCON™).
  - 2) Replace the bottom ash hopper system with a submerged scraper conveyor (SSC).
  - 3) **Divert** the flow of the existing bottom ash slurry piping to new dewatering bins.
  - 4) **Divert** the flow of the existing bottom ash slurry piping to an ASHCON™ system.
With a traditional dewatering system bottom ash slurry can be diverted away from the ash pond into two Dewatering Bins.

The Dewatering Bins feature decanting screens and overflow troughs to dewater the bottom ash to a ~20% moisture content where it can be discharged into trucks for removal.
Traditional Dewatering System:

Common Issues Related to Dewatering Bins:

- Decanting Screen Blockage – Fine ash can blinds screens making them ineffective.
- Drain Line Valve Wear – Fine ash can wear away drain valves causing leaks.
- Large Discharge Gate Issues – Difficult to seal, Difficult to maintain, Often Leak!
- On retrofit projects the existing slurry pumps do not have the ability to lift slurry to top.
When a **DRYCON™ & SSC won’t fit:**

**Exploring the OPTIONS! #4**

- Plants that are considering eliminating the use of their ash ponds have the following options:
  1. Replace the bottom ash hopper system with a dry ash conveyor (**DRYCON™**).
  2. Replace the bottom ash hopper system with a submerged scraper conveyor (**SSC**).
  3. **Divert** the flow of the existing bottom ash slurry piping to new dewatering bins.
  4. **Divert** the flow of the existing bottom ash slurry piping to an **ASHCON™** system.

![Diagram showing options for eliminating ash ponds](image-url)
THE BASIC CONCEPT:

*Divert* the existing bottom ash slurry line(s) to a unique Remote Submerged Scraper Conveyor (ASHCON™) to provide a dewatered ash that can be handled, dust free, for removal. ASHCON™ dewatered ash contains only 15-20% moisture.
THE BASIC CONCEPT:

A basic ASHCON™ system will accept the flow of bottom ash slurry line(s) and discharge dewatered ash for loading into dump trucks. Overflow water from the ASHCON™ can drain into a settling sump or settling pond. A water recirculation system can also be added.
OPTIONS:

If the need for dewatering below 20% moisture by weight is desired, secondary Dewatering Bins can be added.

If bottom ash storage is desired, a single storage bin can be added.