Bottom Ash Options for ELG and CCR Compliance

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CCR and ELG Compliance Requirements
The Coal Combustion Residuals (CCR) ruling and the Effluent Limitations Guidelines (ELG) published in April and November 2015 respectively have established more stringent requirements on where and how CCR materials may be stored and how water used for conveying CCR materials must be controlled to meet the revised guidelines.

Established dates for compliance with CCR and ELG have resulted in an industry-wide review of existing installations and a commitment for a significant investment by power generating facilities.

Bottom Ash Handling Options
Wet under boiler drag chain conveyors have been the preferred bottom ash conveying system for nearly all new domestic power installations built since the mid-1990s. Where this technology can be installed, it still offers the lowest cost solution for compliance with ELG and allows reuse of CCR or direct placement into CCR compliant storage locations.

Prior to the 1990s, most power installations designed to minimize water use and avoid ash storage ponds used a traditional closed loop conveying system consisting of
elevated storage vessel(s) to receive and store the ash, a static clarifying tank and a tertiary tank or basin to store the conveying water for reuse.

While these types of recirculation systems are still an option, a lower cost and better performing system design has become the most widely used technology for sluice conveying operations using static bottom ash storage hoppers. This design uses one or more wet drag chain conveyors sized to receive the intermittent flow of ash transported during bottom ash sluicing operations while also incorporating the function of the static clarifying tank. One benefit of this system is the containment of nearly all material (including fines) in the wet drag chain conveyor and transports all collected ash to a secondary transfer conveyor, transport vehicle or storage bunker.
Concrete storage basins have also been considered as an initial low cost option but potential long term operational and maintenance costs have deterred many installations from choosing this technology as it also carries higher design risks for ELG non-compliance.
Totally dry bottom ash collection and transport options are also available to eliminate all use of water from the process of collecting and storing bottom ash. Continuous operating mechanical conveyor technology to receive the hot bottom ash, cool it and transport it to a secondary conveyor (either pneumatic or mechanical) has been used internationally on multiple installations. However, the ability to retrofit existing boilers has proven to be limited due to physical obstacles that prohibit installation of an elevating discharge conveyor.

An alternate design uses updated technology with a static hopper receiving, storing and cooling the bottom ash with intermittent conveying ash to a storage silo using pneumatic conveying technology. This type of system can be used on more installations than the mechanical conveyors and is being selected as the preferred technology on multiple domestic installations.
The final selection is one that must examine multiple criteria including physical site constraints including not only space for equipment installation but traffic patterns for transport vehicles when required. The time requirement to install each technology varies with ones requiring under boiler modifications needing major outages (4-8 weeks) where remotely installable options only require a short outage (1-2 weeks).

Once those criteria guide the selection of available options, an operating and maintenance cost review coupled with the capital costs associated with each technology will help complete the analysis.

With the fixed timeline for compliance set in the ELG and CCR publications, each utility needs to review their existing installations and decide on their path forward – making sure to understand the time requirements to do the analysis, select the technology, design and procure the equipment and complete installation and operational checkout.