## ADSTRACT Zero Discharge Ash Handling System Costs and Their Sensitivity to Unit Retirement and Ash Make Rate

The U.S. Environmental Protection Agency (EPA) published 40 CFR 423, Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category to the Federal Register in November 2015. The guidelines provide new discharge limitations for wastewater streams formerly categorized as low-volume wastewater. The most significant impact of the proposed changes will be to require coal-fired power plants that discharge bottom ash transportation water to eliminate the discharge. In addition, on April 17, 2015, the EPA published the Final Rule for Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule) at 40 CFR Part 257. The CCR Rule applies to owners and operators of new and existing landfills and new and existing surface impoundments (ponds). The CCR Rule requires

**Bottom Ash from** 

groundwater monitoring of existing active CCR ponds. If groundwater monitoring demonstrates exceedance of a groundwater protection standard, the owner/operator must initiate corrective action. Corrective action can include closing the pond within five years of detecting groundwater impacts.

Because of the synergy between the ELG and CCR rules, the potential strategies for complying with ELG need to be evaluated in conjunction with the impacts to the existing ponds subject to CCR. Coal-fired plants that are sluicing their ash to ponds may be required to eliminate both bottom ash transport water discharge and to close the associated ponds. In these applications, a stepwise approach to compliance is

**To/From Unit Ash Sluice Systems** 

required to first eliminate ash sluicing prior to closure of the ash ponds. Possible technologies to comply include mechanical drag chain systems (under-boiler and recirculating remote), recirculating through CCR-compliant ash ponds, recirculating ash settling basins, and recirculating through geotextile filter tubes. The selection of the technology to be applied must be the most economical for the plant given the challenges facing coal-fired power plants today. Using a series of power plant case studies common to each technology, this paper compares the relative sensitivity of each technology's capital and operating costs, on a present-value revenue requirement basis, to important variables, such as plant life and bottom ash make rate.

**RSDCC** 



Title: Zero Discharge Ash Handling System Costs

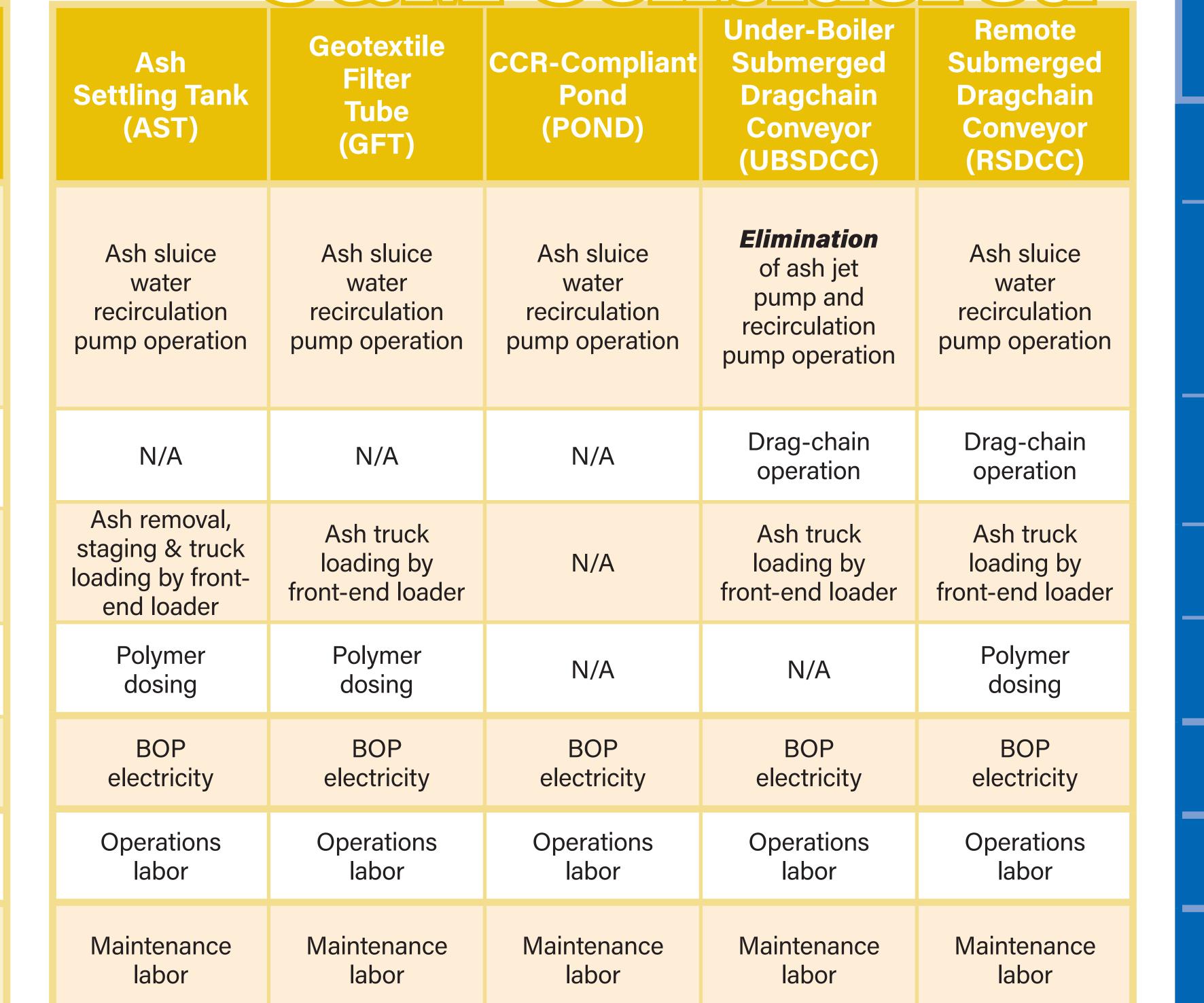
and Their Sensitivity to Unit Retirement and Ash Make Rate

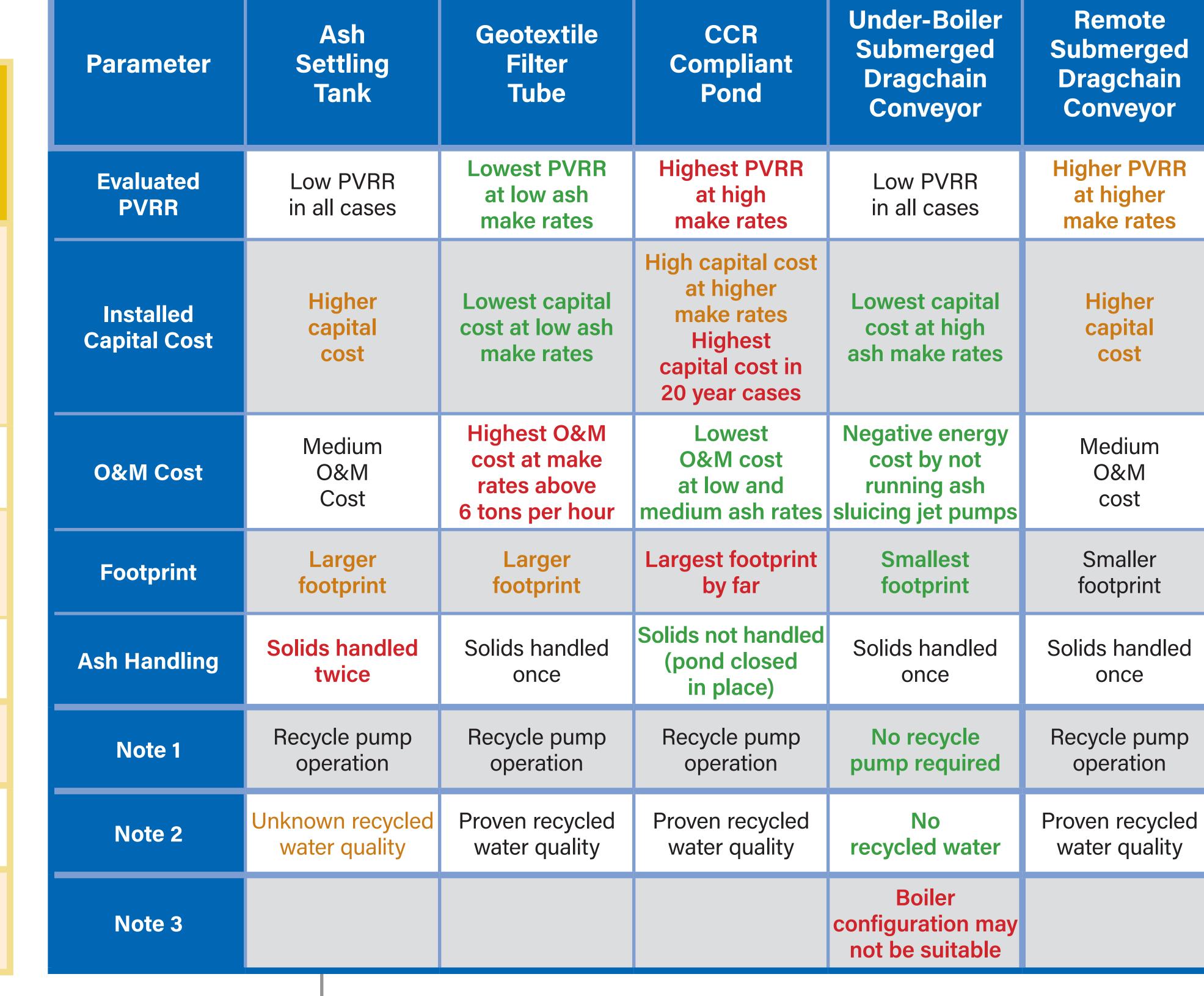
Authors: Matthew K. Heermann and Nicholas P. Vrkljan

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Ash Settling Tank (AST)	Geotextile Filter Tube (GFT)	CCR-Compliant Pond (POND)	Under-Boiler Submerged Dragchain Conveyor (UBSDCC)	Remote Submerged Dragchain Conveyor (RSDCC)
2 x 100% ash settling tanks	N+1 100% GFT bays, one for each GFT required, with one common spare	Pond sized to contain ash for entire evaluation period without dredging (i.e. remaining life of plant)	1 x 100% UBSDC under each boiler	2 x 100% RSDCC sized to dewater entire ash make rate
Reuse existing ash sluicing pumps	Reuse existing ash sluicing pumps	Reuse existing ash sluicing pumps	Ash sluicing pumps are not required (demo)	Reuse existing ash sluicing pumps
Water recycle pumps and bays	Water recycle pumps and bays	Water recycle pumps and bays	Water recycle pumps are not bays	Water recycle pumps
Electrical building	Electrical building	Electrical building	Motor starters reuse existing MCCs	Electrical building
High TSS sump pumps	Ash distribution header			Surge tank
Decant valve	Hoses			Settling tank
Dewatering apron			Concrete ash storage bunker 72 hour capacity	





**5 YEAR EVALUATION PERIOD** 

@ 2 TONS PER HOUR

**20 YEAR EVALUATION PERIOD** 

@ 2 TONS PER HOUR

5 YEAR EVALUATION PERIOD

@ 6 TONS PER HOUR

**20 YEAR EVALUATION PERIOD** 

@ 6 TONS PER HOUR

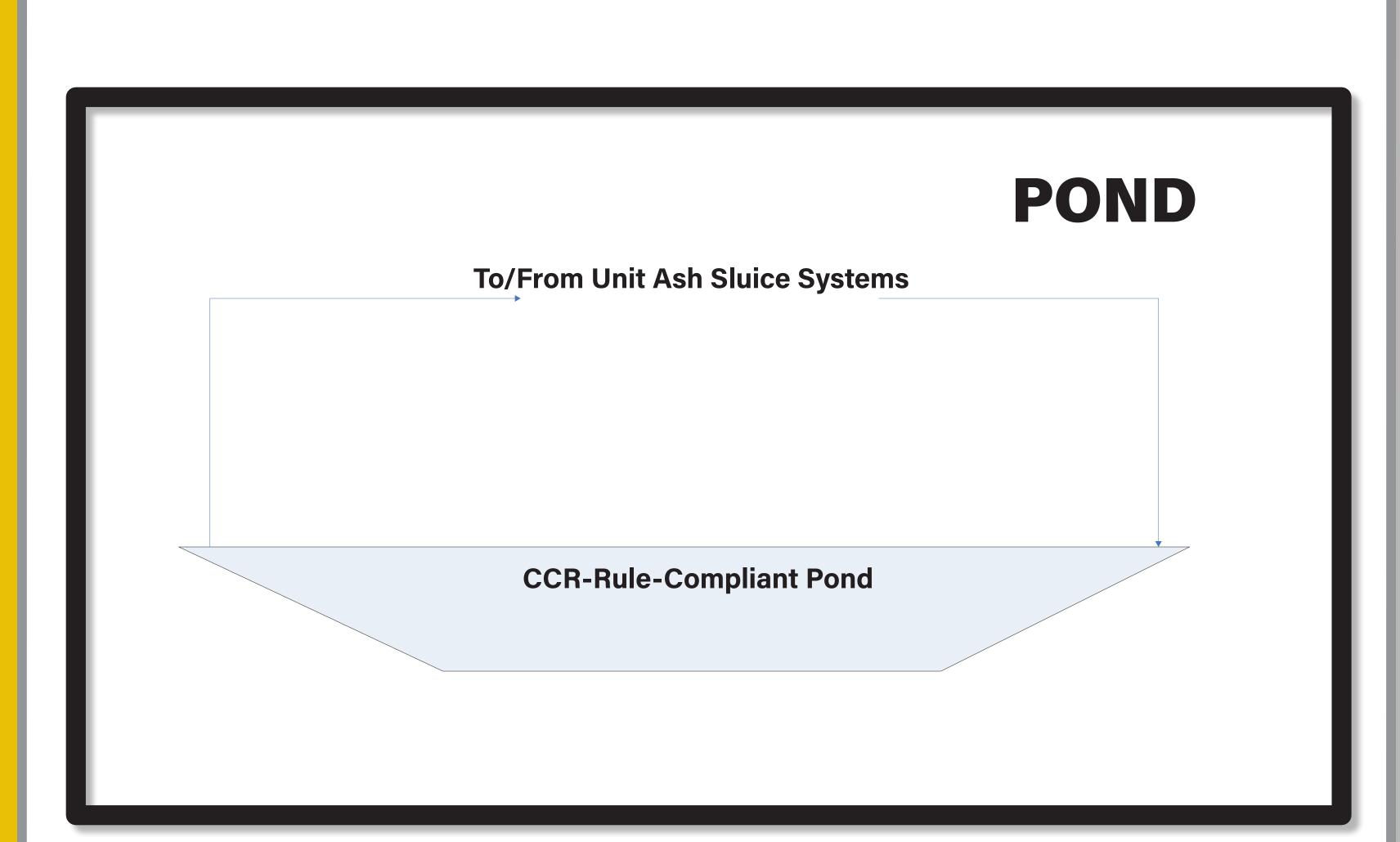
YEAR EVALUATION PERIOR

@ 30 TONS PER HOUR

Sargent & Lundy, LLC

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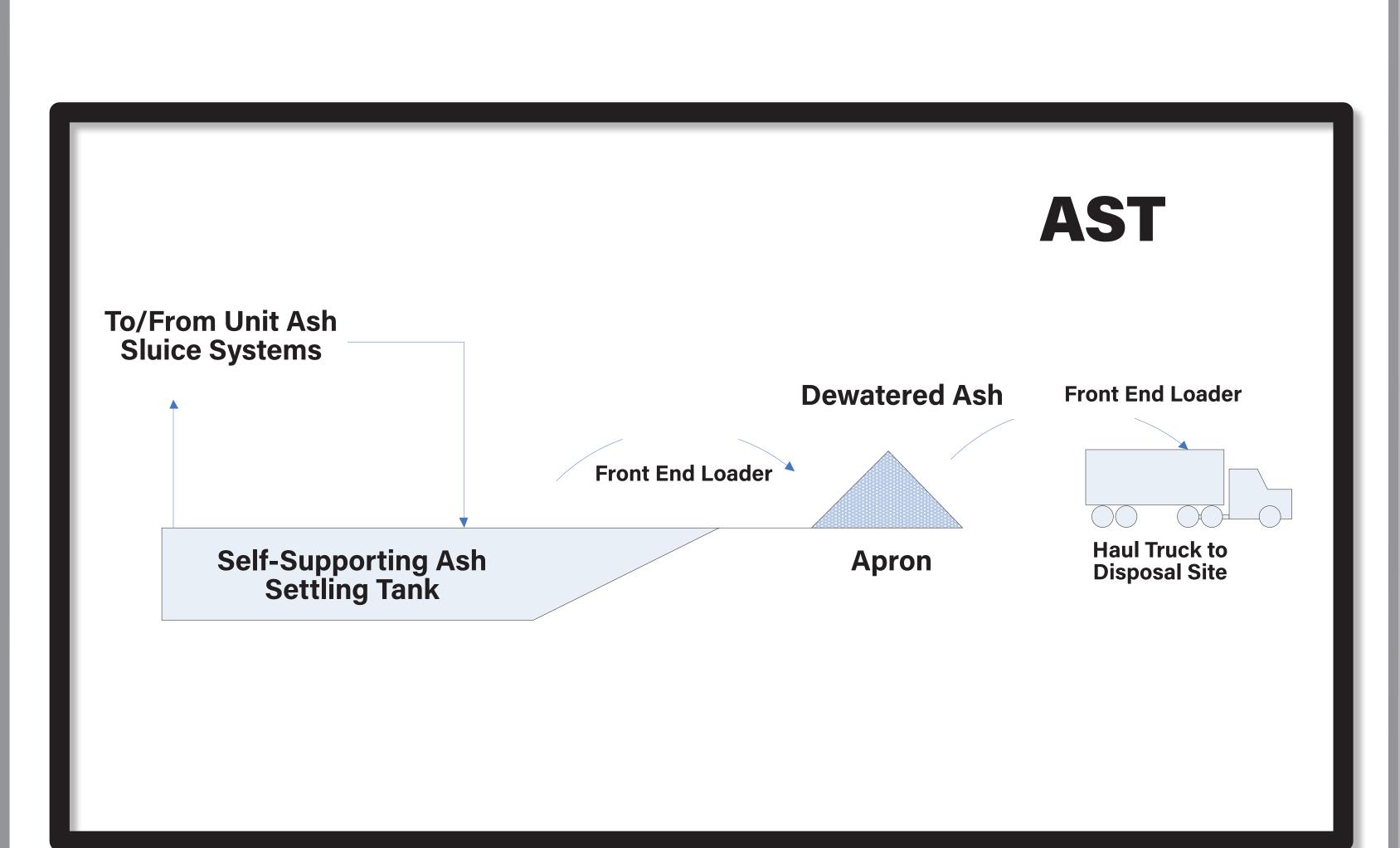
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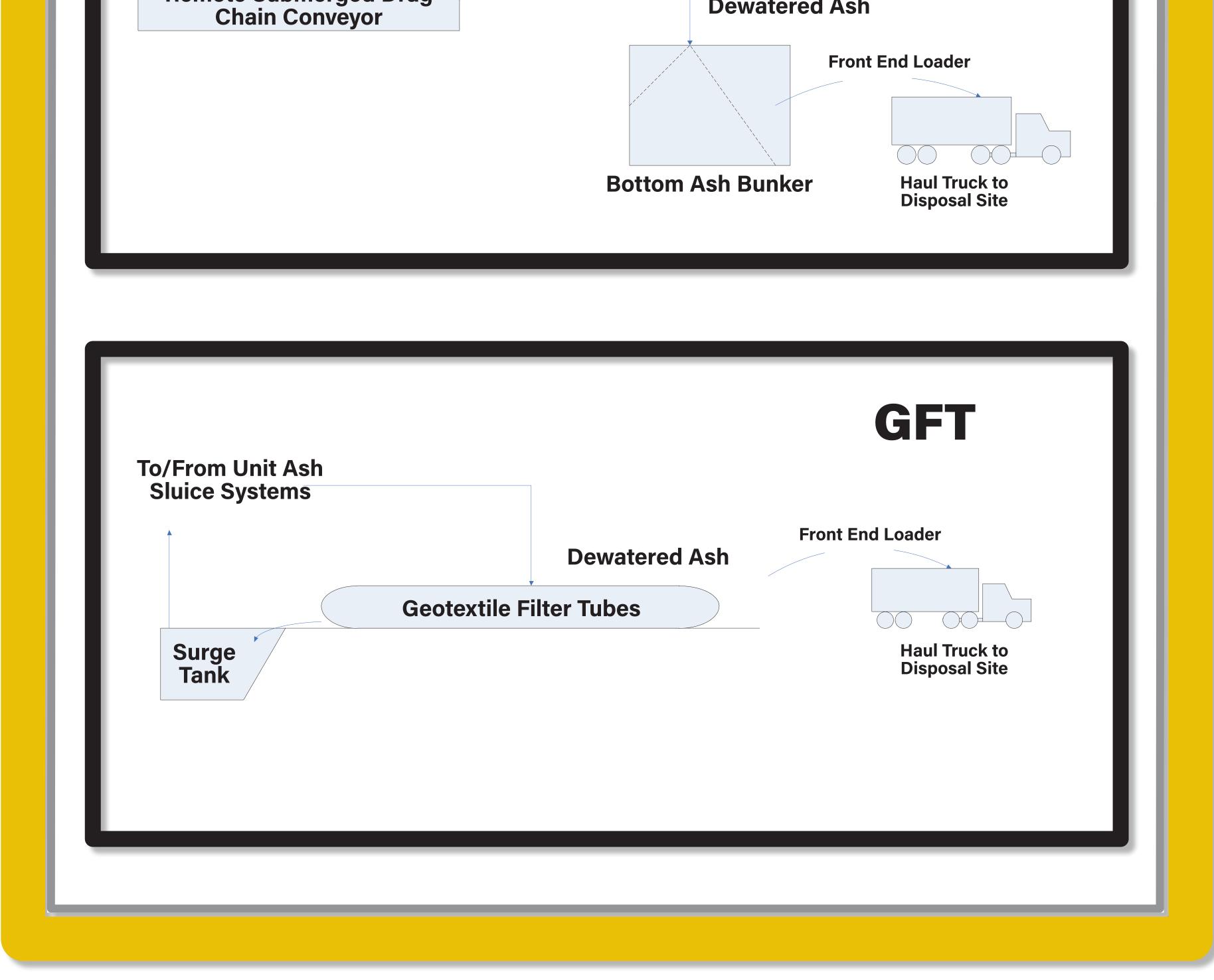


**Belt Conveyors** 

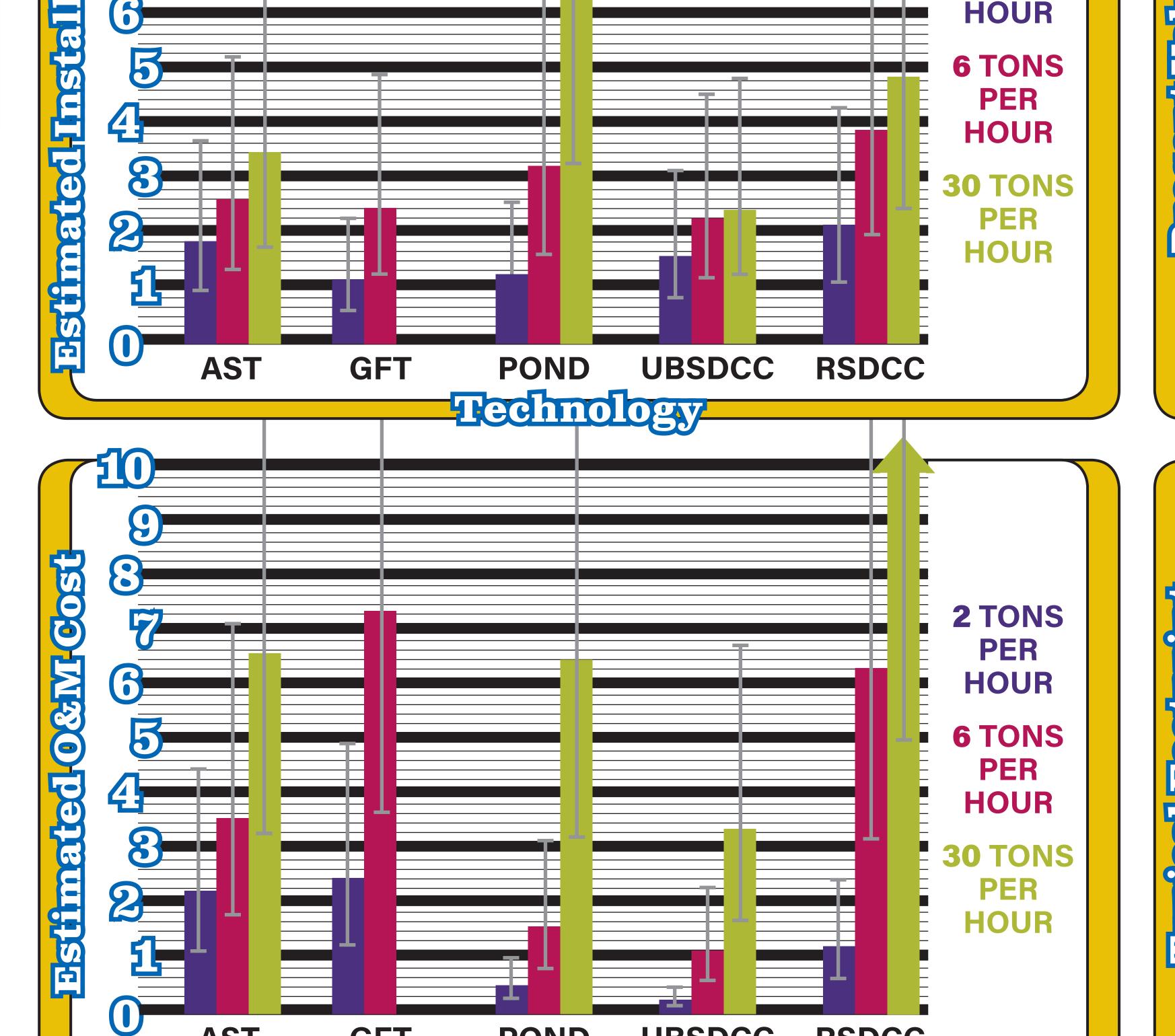
**UBSDCC** 

Haul Truck to Disposal Site

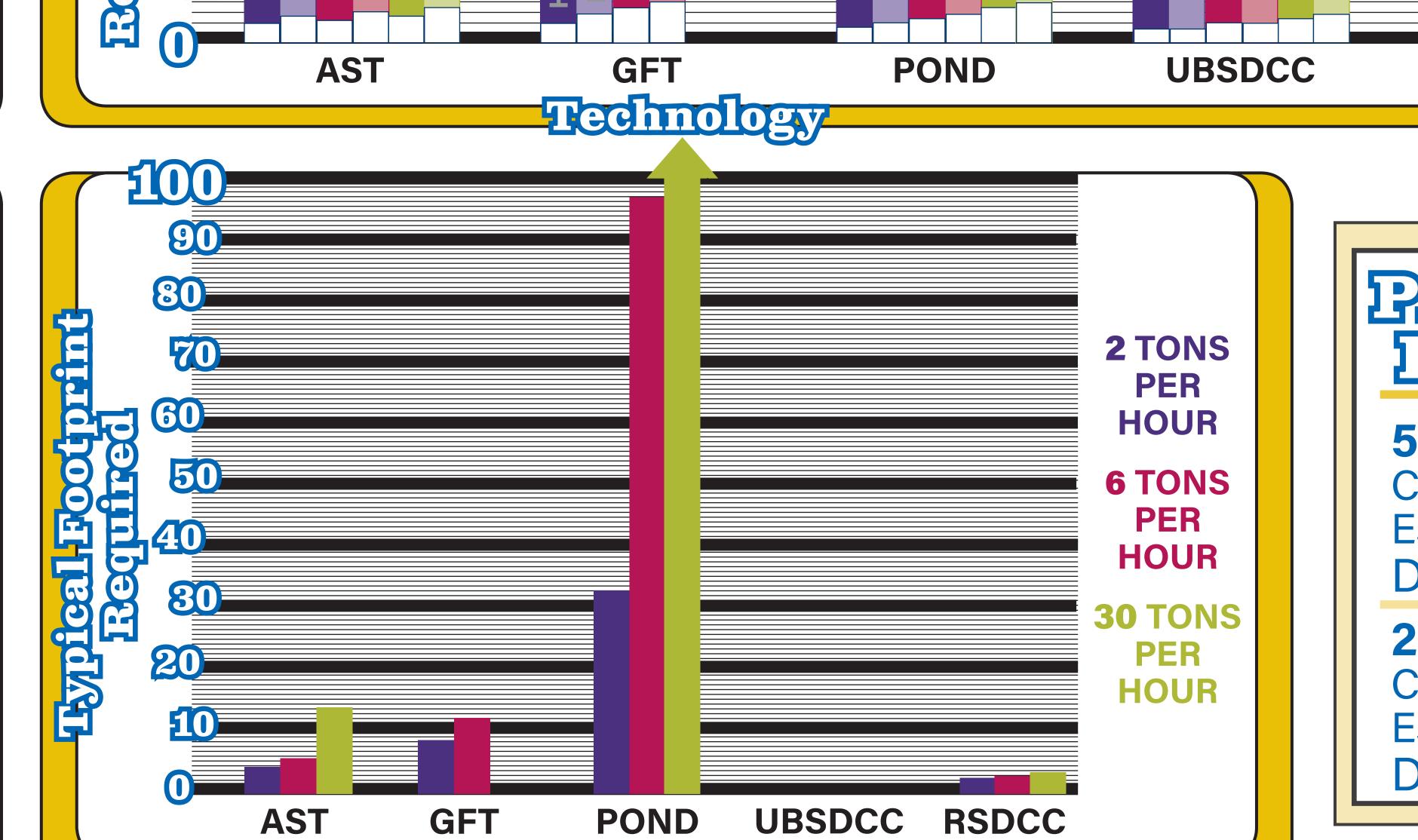




Ash Settling Tank (AST)	Geotextile Filter Tube (GFT)	CCR-Compliant Pond (POND)	Under-Boiler Submerged Dragchain Conveyor (UBSDCC)	Remote Submerged Dragchain Conveyor (RSDCC)		
Sargent & Lundy	TenCate	Sargent & Lundy	Allen-Sherman- Hoff	Allen-Sherman- Hoff		
			United Conveyor Corporation	United Conveyor Corporation		
			Clyde Bergmann	Clyde Bergmann		
			GE-Alstom	GE-Alstom		
			Howden	Howden		



Technology



Technology

