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Reliability Improvements of SaskPower's BD3 Capture Facility Through Operational and Process Design Changes: Experiencing the First Four Years of Operations

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Abstract

Carbon capture and storage technology is a proven CO2 abatement method that has been successfully implemented on various process globally including the retrofit of two coal fired power plants: SaskPower's Integrated Carbon Capture Storage Project on Boundary Dam's Unit 3 (Saskatchewan, Canada) and NRG's Petra Nova Project implemented on W.A. Parish's Unit 8 (Texas, USA). Although demonstrated on the industrial scale, global deployment is not proceeding at the desire pace. This stall in deployment has also stalled technological refinement, which is often a result of implementing multiple generations of a technology over a period of time. However, operating experiences gained in the first four years of operating the BD3 capture facility have yielded both operational and design refinements that can and should be applied to future installations of industrial scale CCS facilities at the benefit of decreases operating and maintenance costs and improve performance and reliability.

As the world's first industrial scale post combustion CO2 capture facility on a coal fired power plant, many lessons were learned through the design, construction and operations of the carbon capture facility at BD3. These lessons have resulted in novel optimizations, operating methods and overall learnings for the facility and its role as a power generator in the power utility. Through this process the original design decisions and intents were challenged, both validating and dis-proving what was at the time the best information available. This paper discusses the design and operational changes that were made as a result of evaluating the performance of the capture facility in the initial years of operation. These changes included: upgrades to instrumentation, installation of redundancy and isolations for key pieces of equipment, isolation upgrades for various other pieces of equipment, installation of flyash mitigation equipment, as well as process modifications for controlling amine degradation. Future upgrades and modifications are also presented in this paper which are supported by extending the capture facility's performance evaluation up to current day operations.

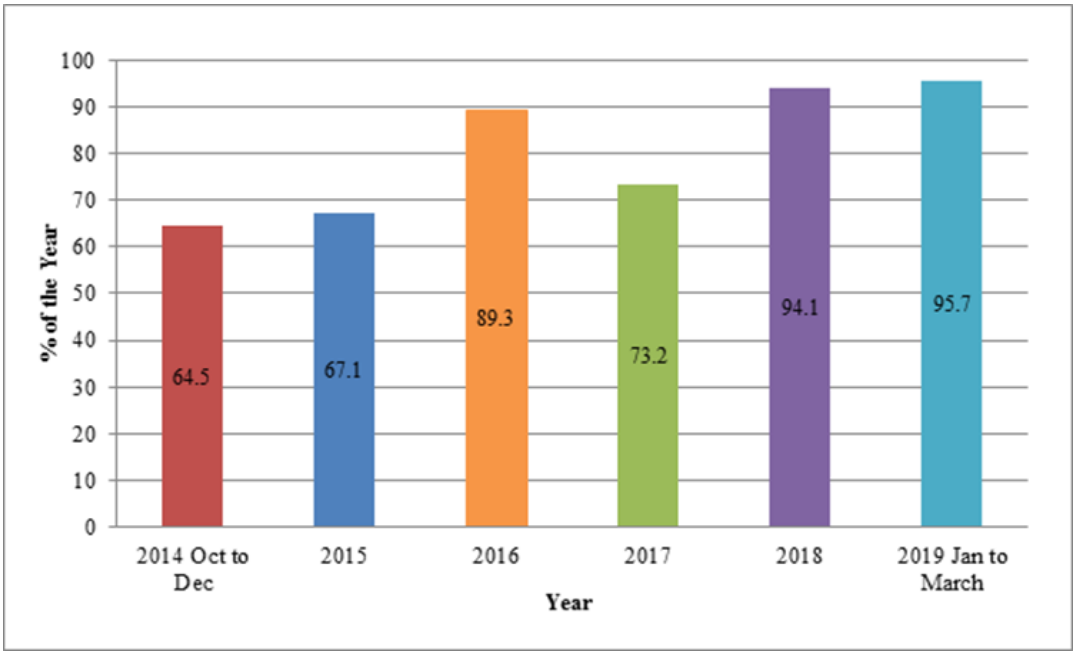

Figure 1. Summary of capture plant availability (October 2014 – March 2019)

Keywords: Post combustion carbon capture and storage, Boundary Dam Unit 3, Coal fired power plants, Capture facility reliability,