

CoalProTech 2020 Technical Program (April 21 – 22, 2020)

Tuesday, April 21, 2020

Session 1: Advanced Coal Preparation Practices and Technologies

Time: 2:00 - 4:00 PM

Session Chair: Robert Moorhead

Presentation No. 1.1

Title: **Impact of Coal Mining on Coal Prep Performance**

Presenter: Dan Yanchak (Consol Energy)

Abstract: Coal process plant operation and optimization professionals must constantly consider what is forecasted and occurring on the mining side of the business. The target parameters of production, cost, and quality are only achieved when the feed streams are accurately predicted. The process plant manager must keep the miners current on the effects to the plant and to the customer due to their mining practices.

Presentation No. 1.2

Title: **Maximizing coal preparation plant performance and mine profitability through the development , application and auditing of plant best practices**

Presenter: Peter Bethel (Marshall Miller & Associates)

Co-Presenters: Steve Keim and Mike Kiser (Marshall Miller & Associates)

Abstract: Current coal markets require the very best performance out of our coal processing plants to let us survive. To achieve this each piece of processing equipment in our plants needs to be run under optimal conditions. The paper will outline how the author over the last 40 years has helped develop best practice standards. Implementation of these standards and subsequently putting in place auditing processes will be discussed. The impact of rigorous best practice implementation will be shown in \$ terms.

Presentation No. 1.3

Title: **Arq Energy Unbound**

Presenter: C. K. Lane (Arq)

Abstract: At Arq, we transform coal and coal waste into a new low-cost form of energy. Our patented Arq Technology is a highly efficient and easily scalable process that can be deployed on mine sites. We've discovered how to recover lost energy from coal discard by grinding it down, breaking it up into a micro particle system, and then separating the material into its elemental parts to remove impurities. Arq Fuels are micronized and purified hydrocarbons, a new high-performing and high-value energy source. By eliminating impurities, we have created a completely new category of energy products which can be used as a component in liquid fuels or as a substitute for coal in specialized industrial processes. The process uses advanced chemistry and highly-efficient mechanical processes to separate a high performing 99% pure hydrocarbon from mineral matter. Arq Fuels are an ultra-low-cost alternative to conventional energy.

Presentation No. 1.4

Title: **SCI Fine Coal Recovery System Provides Insurance Against Lost Tons Through Direct Recovery**

Presenter: Mike Barish (Somerset)

Co-Presenters: Tony Toney, Dave Osborne and Cliff Raleigh (Somerset)

Abstract: Thousands of tons of high value metallurgical coal are lost every year through the coal plant waste streams, primarily the thickener feed. The bulk of these tons are minus 100 mesh. First, many of these tons are lost due to the mistaken belief that recirculating screen drain from the screen bowl centrifuge (SBC) captures most, if not all, of the tonnage in the stream. Secondly, the bowl effluent is directed to the thickener

as, up until recently, there was no method to economically recover these tons at an acceptable moisture. SCI uses a solution-based approach for the direct recovery of ultra-fine coal through the use of the patented SCI Fine Coal Recovery System to recover these tons and deposit them on the plant clean coal belt for sale. Globally, SCI and SIA have over 20 installations incorporating a solid bowl centrifuge (Sub325[®]), mini flotation column (Sub325 Effluent Flotation[™]), desliming cyclones, tertiary flotation columns, thickening cyclones, and clean coal thickeners.

This paper will highlight how SCI's Fine Coal Recovery System can provide insurance against lost tons under the misguided assumptions that: a) the SBC recycle load is light; b) The SBC recycle load causes no issues in the plant; c) the SBC recycle load is **fully** recovered; d) the SBC effluent load is light; and e) the currently lost coal cannot be economically recovered.

Presentation No. 1.5

Title: **Commercial Application of the Hydrophobic-Hydrophilic Separation (HHS) process for the Recovery of Ultrafine Coal from Thicker Underflows**

Presenter: R.-H. Yoon (Virginia Tech)

Co-Presenters: James Reyher,¹ Trey Jones,¹ Chad Sechrist,² Serhat Keles,² Nikhil Gupta,² Peter Bethell,³ Jerry Luttrell,² and Roe-Hoan Yoon.² (¹Minerals Refining Company, ²Virginia Tech, ³Consultant)

Abstract: Flotation is recognized the best-available method of beneficiating fine coal. However, its efficiency is limited to a narrow particle size range of 45-150 μm . To cope with this problem, many companies discard the -45 μm fraction to refuse thickeners to improve the efficiency and throughput of their flotation circuits, and to minimize the costs of dewatering downstream. In this presentation, we will report the first commercial deployment of the hydrophobic-hydrophilic separation (HHS) process at an operating plant in the U.S. A thickener underflow with >40% ash will be fed to the HHS plant at ~22% solids to produce 20-25 tons/hr clean coal assaying 5-6% ash and 6-7% moisture. The laboratory and pilot-scale tests conducted at Virginia Tech suggest that the HHS plant should operate at organic efficiencies of >97%.

Wednesday, April 22, 2020

Session 2: Design and Operating Practices for Slurry Impoundments

Time: 9:00 - 11:00 AM

Session Chair: Hunter Davis, Alliance Coal

Presentation No. 2.1

Title: **Merits of the Continued Use of Upstream Construction for Slurry Impoundments**

Presenters: Seth Frank and Andrew Kolbert (Schnabel Engineering)

Abstract: On November 5, 2015, and January 25, 2019, two high profile (and tragic) tailings dam failures occurred in Brazil. Resulting industry-wide scrutiny is warranted. However, it is important to understand distinct differences between the two failed dams and those in the US coal industry. We will briefly review findings from the publicized Fundau Tailings Dam Investigation and early indications for Brumadinho. We will also discuss how Schnabel adapts state-of-the-industry mapping and models for breach inundation and Emergency Action Plans.

Presentation No. 2.2

Title: **Automation Delivers Safety Benefits for Tailings Facilities**

Presenters: Landon Lounsbury and Mike Judd (RCT-Global)

Abstract: RCT's ControlMaster[™] automation and control technology has a proven history of integrating into any type of mobile mining plant to removing site personnel from hazardous situations such as proximity to tailings facilities. ControlMaster[™] is technologically agnostic and has a long history of integrating seamlessly with mobile mining plant from various Original Equipment Manufacturers and

subsequently carrying out the full range of machine functions. RCT will present examples demonstrating how ControlMaster™ is scalable to site-specific requirements including implementing Line-of-Sight remote solutions and more complex Teleremote solutions from secure control rooms. ControlMaster™ has enabled mine management at various coal mines throughout North America to safely engage with upstream tailings facilities. The technology has enabled mining companies to remain fully compliant with all Mine Safety and Health Administration (MSHA) requirements and maintain and even improve waste management operations.

Presentation No. 2.3

Title: **Vertical Wick Drains to Accelerate Consolidation of Problem Soils Coal Refuse Disposal Impoundment in Western Kentucky**

Presenters: Mitchell S. Halsey (Schnabel Engineering)

Abstract: At some refuse disposal sites, there are deep, soft, saturated soils that are problematic because of low in-situ strengths and large times required for consolidation/strength gain. Delayed consolidation can affect the construction rate of the overlying refuse fill. To accelerate consolidation and strength gain so that the overlying embankment can be built in a timely manner, wick drains were used. This presentation will provide details of why wick drains were selected and how they were designed and installed.

Presentation No. 2.4

Title: **Reclaiming Impoundments Using Reinforcing Geosynthetics**

Presenters: Santino Piccoli (TenCate Geosynthetics Americas)

Abstract: Earthwork operations over soft impoundments can be very challenging, specifically regarding personnel safety. Given that impoundment material can approach near-zero shear strengths, conventional earthwork operations can become extremely time consuming and costly, if not impossible. High-strength reinforcing geosynthetics can be used to create a safer construction platform enabling accessibility of equipment and personnel over these soft deposits. Presented herein is a review of a proven design approach, installation and filling operations using a geosynthetic reinforced construction platform.

Wednesday, April 22, 2020

Session 3: Advances in Dry Coal Upgrading Technologies

Time: 2:00 - 4:00 PM

Session Chair: Greg Gillian, Stantec

Presentation No. 3.1

Title: **Reducing Ash Content in Power Plant Feed at Prairie State Energy using Sensor-Based Sorting**

Presenters: Daniel McLean, Harold Cline and Anthony Mattingly (Prairie State Generation)

Co-Presenters: Harold Cline and Anthony Mattingly (TOMRA)

Abstract: Prairie State Energy Campus is a 1.6GW base load, coal-fired, electrical power station with an adjacent underground coal mine near Marissa, Illinois. Currently, approximately 90% of the material from the mine is appropriately sized and typically averages 8800 BTU and 26% ash content. This feed is sent to the adjacent power plant immediately. However, the remaining 10% is oversized and is sent to a breaker, resulting in a 7200 BTU and 40% ash content product. This high ash content feed is not only inefficient, but the resultant silica particles cause abrasion and degradation of power plant components. In August 2019, Prairie State installed a Tomra X-Ray Transmission (XRT) sorter as a pilot plant on-site. To date, the sorter has demonstrated reduction of ash content to 14% and thermal content up to 10400 BTU at 80 – 120 tons per hour.

Presentation No. 3.2

Title: **Clean Coal: Differentiating Coal Qualities Using a Sensor Sorting**

Presenters: Lütke von Ketelhodt (Steinert)

Co-Presenters: Ian Hamilton, Jeremy Hundley and Tyler Huff (Steinert)

Abstract: Coal continues to be a vital source of electricity and a basic component of the steel making process. However recent years have proven that coal extraction is an increasingly volatile economic prospect. Sensor based sorting has the capability to respond rapidly with the flexibility to adapt to changing market conditions. Extensive test work conducted at Steinert US has shown the capability of x-ray transmissive technology to reduce ash content and upgrade calorific values. We examine two cases that demonstrate the dynamic flexibility of this new technology and its application in the coalfields.

Presentation No. 3.3

Title: The Economic Impact of X-ray Sorting Applications in Coal Production

Presenters: Charles Roos (Mineral Separation Technologies)

Co-Presenters: Chad Sechrist¹, Serhat Keles¹, Wencai Zhang¹, Aaron Noble¹, and Rick Honaker² (¹Virginia Tech; ²University of Kentucky)

Abstract: Electronic ore sorters have been widely used in the gemstone and diamond industries for many decades; however, recent advances in microprocessor technology have led to reduced equipment costs, prompting many coal operators to consider this unique separation technology. Dual-scan x-ray transmission sorting provides a low-cost alternative to effectively treat coarse run-of-mine coal by rejecting rock prior to transportation. When properly implemented into applications with long haulage distances or significant out-of-seam dilution, this technology has the potential to provide significant economic and environmental benefits. This paper provides a detailed techno-economic analysis using operational data from a DriJet mobile sorter unit built by Mineral Separation Technologies, Inc.

Presentation No. 3.4

Title: Dry Cleaning of Coal Using the FGX Machines- A Status Report

Presenters: B.K. Parekh (FGX Septech, LLC)

Co-Presenters: Ron Bowling and Jing Li (FGX Septech, LLC)

Abstract:

Wet processing of coal is quite efficient it requires an elaborate set up and in many cases is not suitable to operate near the mine site. Pneumatic (dry) processing of coal is economical as it will not require water or dewatering/drying of the product. Another potential benefit of dry coal cleaning is the reduction in transportation costs of the run-of mine (ROM) coal. Dry coal cleaning techniques can be divided into four groups; air table, air jig, X-ray sorting and dry dense medium separation. Primarily air table and air jigs have been used on a commercial scale to clean coal. This presentation describes the current status of the FGX dry coal separators in the USA and also providing a novel approach of processing of 100 mm x 0 size coal using a combination of the conventional FGX process and the magnetite fluidized bed technique.