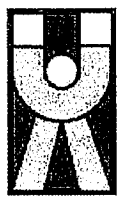
Commercial Demonstration of the Manufactured Aggregate Processing Technology Utilizing Spray Dryer Ash

Quarterly Technical Progress Report
April 1, 2006 through June 30, 2006

Gary L. Cairns, P.E.

July 2006

DOE Cooperative Agreement DE-FC26-02NT41421



Universal Aggregates, LLC
1020 Lebanon Road
West Mifflin, PA 15122

DISCLAIMER

TABLE OF CONTENTS

ABSTRACT

This is the quarterly report under the subject agreement for the period from April 1, 2006 through June 30, 2006. The report summarizes activities for the project for the period in the following categories: personnel, operations, engineering, technical support, marketing support, and miscellaneous.

Executive Summary

Approximately 17,250 tons of dry SDA were processed through the plant in this quarter. Efforts were focused on extensive equipment and control modifications and evacuation of the curing vessel (CV). These efforts will insure improvements in both plant production and availability. No aggregate was produced in this quarter. Aggregate production will resume in July.

EXPERIMENTAL

This section is not applicable to this project.

RESULTS AND DISCUSSION

Personnel

The plant continues to be operated and staffed on a 24-hour/7-day basis. During this quarter, two new laborers were hired and one mechanic departed UA to return to his hometown. The total number of hourly employees at the plant is currently at 20.

Operations Summary

In April, approximately 3,700 tons of dry SDA were processed through the plant. Extensive maintenance, repairs and installation of new equipment were completed throughout the plant this month. Consequently, there was no aggregate production. In early April, BPP was down for more than five days due to a fire in boiler and other operational problems. An Acrison service technician was on-site for two days addressing erratic performance of SDA feeder K120A. Numerous discussions were held with BPP personnel concerning the source of and corrective actions for incoming tramp metal and SDA lumps. The CV was manually cleared and recirculated extensively, while the temperature and moisture of the material were monitored.

In May, approximately 6,700 tons of dry SDA were processed through the plant. Maintenance and installation of new equipment continued this month. PLC control logic for the new equipment and motor sequences was loaded and tested (RTP). Start-up of the new CV recirculation system was completed and the system was operated extensively. In total, more than 4,000 tons were re-circulated through the CV. In conjunction with the recirculation, efforts to clear deposits in the CV cans were accomplished by manually air lancing and pneumatic moling. UA contacted Jerry Johanson, the CV design engineer, to schedule a site visit to further evaluate the current condition of the CV. An existing slide gate at the base of the SDA daybin was configured to operate automatically with feeder refills. This action eliminated intermittent flushing, which greatly improved control of SDA feed to the pugmill. On May27, a record single-day total SDA throughput for the plant was achieved (414 tons).

In June, approximately 6,850 tons of dry SDA were processed through the plant. On several occasions in June, mild evening weather prompted BPP to cycle the power plant off (typically midnight to 6 am). All SDA generated at BPP were transported for use in landfill daily cover, none for landfill disposal. Recirculation and evaluation of the CV continued this month. Jerry Johanson, the CV design engineer, was on-site to observe and advise on the condition of the CV. Subsequently, UA team decided to empty the CV prior to charging with green extrudates. The secondary screen and horizontal impactor were adjusted so that all coarse material could be scalped/preserved and used to recharge the CV. Extensive prep work and safety training were completed in advance of evacuating the CV. At month's end, the CV was ~ 90% empty and more than 560 tons of cured material were stockpiled and covered.

Engineering

Engineering continued its efforts on the following problem areas of the plant: repeated mechanical failures of rotary valves, transfer of pulverized lime to the tumbler, performance of recycle feeder (K250), flushing of screw conveyor L120A, performance of scrubber at top of CV, alternative level instruments for CV cans, and current status of CV. Upon identifying tramp metal and other debris as the cause of rotary valve failures, a custom sieve was designed/fabricated for the inlet to the SDA bin (via Airotech). Barry Stacy of Screw Conveyor Corp. was on-site to review/analyze performance issues with two existing screws (L120A and L320) and letdown screw options at the top of the CV.

UA engineers consulted with Pulva Corporation for the design/fabrication of a larger discharge chute for the lime pulverizer. Consultation was also made with the slide gate manufacturer (Salina Vortex) regarding the duty cycle of existing valve on SDA daybin. Consequently, engineering directed to automate the operation of the slide gate valve with feeder K120A refills. Following recommendations from Acrison, a smaller auger and cylinder were ordered for the K250 recycle feeder. Pinch valve parts were specified to improve control and simplify adjustment of water discharging from the scrubber. UA consulted with RTP and instrument vendors regarding instrument options for top of CV. Engineers supervised contractors for the installation of the new CV recirculation system, dust collector at elevation 144', all new ductwork, and catwalks around feeders K120A and K120B. Engineers from Pace Projects were on-site to discuss material handling options at the top of the CV and other topics.
While on-site in June, Johanson recommended installation of flow dampers mounted to the base of the internal pintle of the CV. Such dampers would be externally adjustable and enable biasing of material flow through the CV, if necessary. Subsequently, a conceptual design sketch of the dampers was prepared and forwarded to Imperial Technologies Inc. (ITI). A detailed design was finalized and fabrication is underway. During the design of the dampers, ITI compiled the design drawings of the CV into a user-friendly three dimensional software package. The result was a 3D model of the CV that offered an excellent visual of the entire vessel, which aided in the evacuation effort. All engineering was completed for the new water spray box at the inlet to the pugmill.

Technical Support

Lump (or chuck) samples collected from bottom of curing vessel were characterized during curing vessel cleanup and discharge. The causes of most lump formation were identified. The recent equipment and control modifications should reduce or eliminate lump formation in future curing vessel operation. It is also important to implement the QA/QC program to insure proper operation during curing vessel charge. Hydrated lime and carbon contents in spray dryer ash (SDA) were monitored for ash quality in this quarter. The averages of hydrated lime contents were 11.7±3.2% in April, 9.0±2.7% in May and 9.8±1.5 in June. The decrease in hydrated lime content from the last quarter is related to improvement in spray dryer operation at BPP. The carbon contents in SDA were mostly in the range of 3.9 to 6.2 %. Both are adequate for aggregate production.

Marketing Support

Conduct regular, weekly meetings (on-site) with contract aggregate distributor/buyer regarding status of plant start-up and quality control. Continue to assist with plant start-up and operations, observing and troubleshooting at CV, product transportation, and communications to potential consumers/users.

Miscellaneous

New conduit and wiring was routed (QPS and UA) throughout the plant to accommodate all new equipment. All new wiring changes were documented through RTP. Rod magnets and access doors were installed beneath BPP's ash silo to address incoming metallic debris. L120A screw conveyor was disassembled to inspect existing flighting and shrouding. Subsequently, two sections of shrouding (10' in total) were reinstalled at a lower position to reduce clearances and increase mechanical resistance. Columbia Rubber was contracted to replace two belts (L510C and L310E). The sheaves on screw conveyor L320 were changed to double the speed of rotation. Additional access ports were added to the top of all CV cans. The customized chute for the Schlagel rotary distributor was installed at the top of the CV. Installation of conduit and wiring for all new equipment was completed. The new discharge chute for the lime pulverizer was received and installed. The wet scrubber tank and blower was cleaned/serviced. Replacement instruments were specified for failed pressure transmitters at pump discharge lines at the scrubber and the process water tank. In order to process SDA and discharge the CV simultaneously, an auxiliary conveyor belt was installed on the ground floor. Corporate safety department procured hardware and conducted necessary training to allow UA personnel to safely enter and work inside the CV (e.g., confined space, supplied air, rigging). An existing unused belt conveyor in the plant was relocated to the base of the CV to facilitate recharging the CV. Contractors installed a pantleg discharge box on the top of the 'D' can. A new auger and cylinder were installed on the Acrison recycle feeder (K250). Contract electricians have begun conduit work for the installation of the new motor (400 HP) and variable speed drive for the pugsealer.

DOE

The Quarterly Technical Progress Report was submitted for the first quarter of 2006. A request for a no cost contract extension to December 31, 2006 was written and submitted.

CONCLUSION

Actions were being directed to correct the problem areas for improvements in both plant production and availability. Progress was made on ash feeder systems, ash transfer, curing vessel recirculation, lime pulverizer, PLC logic control and curing vessel cleanup. Aggregate production will resume in July.

REFERENCES

Not applicable for this report.