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

Quarterly Technical Progress Report

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Abstract

This quarterly report covers the period from July 1, 2005 through September 30, 2005. It covers: technical development, permitting status, engineering status, construction status, operations summary and marketing support activities for this period.

Executive Summary

Plant startup is still continuing. Testing of mixing modifications to enhance extrusion and SDA wetting is continuing. Efforts are underway to improve plant availability.

I. EXPERIMENTAL

This section is not applicable to this project.

II. RESULTS AND DISCUSSIONS

This section is broken down into the following subsections: Technical Support, Permitting, Engineering, Construction, Marketing Support, Operations Summary and DOE activities. These subsections describe the activities that have taken place during this quarter as they pertain to this project.

(A) Technical Support

The parameter test to increase stiffness of "green" extrudant was completed in early July. It was identified that relatively strong extrudants can be produced at high SDA throughput and high extruder vacuum with addition of embedding material for charge of curing vessel. A test program was conducted to examine curing vessel velocity profiles at different belt feeder speeds from August 2 to 24. The objective is to adjust speeds of three discharge belt feeders (410B, 410C and 410D) to achieve uniform or near uniform flow with circulation of Solite and limestone (50/50) in the curing vessel. Solite/limestone were distributed automatically from newly installed rotary chutes to four cans (A, B, C and D). Radar probes were used to monitor can levels. Dowel probes were inserted in four main vessel mainways (AB, BC, AC and BD) to determine velocity profiles from August 2 to August 18. Dowel and radar probes were used at two different locations to determine velocity profiles and gradients in four cans for comparison from August 17 to August 24. Test results indicated that there were no significant velocity gradients across any of the curing vessel cans and movement of Solite/limestone was slightly higher in C and D cans (south) than those in A and B cans (north). Material in the main vessel manways was mostly in dead zone with relatively slow movement. Coarse aggregate was segregated in 410 C belt feeder (center). Jerry Johanson, the designer of curing vessel, visited Birchwood plant to participate in the testing and to evaluate test results and curing vessel performance on August 23 and 24. Jerry confirmed the higher material movement in C and D cans and estimated the dead zone in main vessel at about 7%. The differential movement could be corrected by inserting a wedge plate in feeder. In essence, he concluded that there are no operational problems for charging curing vessel with extrudants and embedding material to re-start the integration run for aggregate production. Charge of curing vessel with extrudant and embedding material was initiated on August 26.

Quality of extrudants at exit of die plate and at the entrance of curing vessel was monitored to insure sufficient stiffness for curing vessel charge in September. Properties of curing vessel materials (in and out) and recycles were characterized for process monitoring and quality control. Samples collected had consistent unit weight and size gradation, indicating adequate performance of curing vessel operation. It is estimated that recycle still contains 20% to 25% of Solite and limestone, which can decrease stiffness of extrudants at high feedrate as a mix component in pugmill. Crushed aggregates collected from stockpile met lightweight specifications in unit weight and size gradation. Hydrated lime and carbon contents in SDA were characterized to monitor ash quality. Both were within normal range for extrusion.

(B) Permitting

No activity this quarter.

(C) Engineering

Work for the fall outage, including construction meetings and procurement of necessary items, continued until September 23, 2005.

(D) Construction

The majority of the work completed during the outage was maintenance. One item that would be considered new was the installation of a flexible rubber liner in the tumbler.

In July, a new feeder bottom was installed on K-120A-SDA feeder.

(E) Marketing Support

Conduct regular, weekly meetings (on site) with contract aggregate distributor/buyer regarding status of plant start-up and quality control.

As part of Universal Aggregates' contingency plan through plant start-up; two, municipal solid waste landfills continue to beneficially utilize the fixated SDA, as "Alternate Daily Cover," on a regular basis.

Continue to assist with plant start-up, process and product testing, admixture evaluation, contingency plans, product transportation, and promotion to potential consumers/users.

(F) Operations Summary

We continue to staff and operate 24 hours a day. We continue to have a weekly safety meeting and we are still looking for additional manpower to staff the plant, specifically: mechanic, electrician, and operating technicians.

The parometric tests to increase stiffness of "green" extrudants were completed in early July. It was identified that relatively strong extrudants can be produced at high SDA throughput and high extruder vacuum with the addition of recycle material. We completed refill of the curing vessel with Solite and limestone, and confirmed operation of the curing vessel new rotary distribution chute. The UA plant was operated steadily at 18,800-20,000 lb./hr. extrusion for most of the time in July. The steady operation demonstrated that recent modifications in the pugmill, pug sealer and extruder were successful to improve extrusion operation.

A test program was conducted to examine curing vessel velocity profiles at different outlet belt feeder speeds. The objective was to adjust the speeds of the three discharge belt feeders (410B, 410C and 410D) to achieve uniform or near uniform flow with circulation of Solite and limestone (50/50) in the curing vessel. Solite/limestone blend was distributed automatically via the rotary chute to the four cans (A, B, C and D). Radar probes were used to monitor can levels. Dowel probes were inserted in the four main vessel mainways (AB, BC, AC and BD) to determine velocity profiles from August 2 to August 18. Dowel and radar readings were used at two different locations to determine velocity profiles and gradients in the four cans for comparison. Test results indicated that there were no significant velocity gradients across any of the curing vessel cans and movement of Solite/limestone was slightly higher in C and D cans (south) than those in A and B cans (north). Material in the main vessel manways was mostly in the dead zone with relatively slow movement. Coarse aggregate was segregated onto L- 410 C belt feeder (center).

Jerry Johanson, curing vessel designer, visited Birchwood to participate in the testing and to evaluate test results and curing vessel performance on August 23 and 24. Jerry confirmed the higher material movement in C and D cans and estimated the dead zone in the main vessel at about 7%. The differential velocity may be corrected by inserting a wedge plate in the feeder outlet. In essence, he concluded that there were no problems in charging the curing vessel with extrudants and embedding material. He recommended operating the L-410 B feeder (west) and L-410 D feeder (east) at an equal discharge rate with L-410 C pulsing for material movement in the center. Charge of the curing vessel with extrudant and embedding material was initiated on August 26. The UA plant was operated at 14 ton/hr SDA feed rate including SDA in the embedding material.

During the month of September, we continued to work towards integration of the plant including continuous operation of mixing, extruding, curing, screening and crushing for aggregate production. The plant was operated with a dry SDA feedrate of 14 to 15 tons/hr., including SDA in the embedding material with a 64.8% availability. The plant produced about 1,500 tons of extruded products through the curing vessel for aggregate production up to September 24. The rest was sent to landfill for use as alternative daily cover. About 1,000 tons of crushed aggregate products were shipped to Versalite Sales. Problems in the tumbler, recycle feeder, pugsealer and screen operation and recycle quality inhibited continuous aggregate production. The Birchwood Station underwent their Fall outage from September 24 to 28. Work conducted at the plant during the outage include; modifications of the tumbler; recycle feeder, screen, pugsealer, ash and water injection system, and cleaning of pugmill and pugsealer. The objective of these modifications is to improve plant availability for aggregate production.

Quality of extrudants at the exit of the die plate and at the entrance of the curing vessel was monitored to insure sufficient stiffness for a curing vessel charge. Properties of curing vessel materials (in and out) and recycle were characterized for process monitoring and quality control. Samples collected had consistent unit weight and size gradation, indicating adequate performance of the curing vessel operation. It is estimated that the recycle still contains 20% to 25% of Solite and limestone, which can decrease stiffness of extrudants at high feedrates as a mix component in pugmill. Crushed aggregates collected from the stockpile met lightweight specifications in unit weight and size gradation. Hydrated lime and carbon contents in the SDA were characterized to monitor ash quality. The average of hydrated lime contents was 13.0±1.8, which was slightly higher than those in August (11.1±2.4). The carbon contents in the SDA were in the range of 3.9% to 4.5%. Both were suitable for extrusion.

Universal Aggregates continues with complete ash processing and disposal responsibilities.

(G) DOE

The Quarterly Technical Progress Report was submitted for the second quarter of 2005.

At the request of DOE, a paper, entitled "Commercial Demonstration of the Manufactured Aggregate Processing Technology Utilizing Spray Dryer Ash", was presented at the Twenty-Second Annual International Pittsburgh Coal Conference, Session 30 "Advanced Energy System Demonstration 2", on September 14, 2005.

A proposal was submitted to extend the Co-operative Agreement. The proposal emphasizes the need to operate the Birchwood facility for longer duration and at increased capacity.

III. CONCLUSION

The schedule has been revised for phase III. The activities described in section II will continue into the next quarter.

IV. REFERENCES

Not applicable for this report.