

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

Quarterly Technical Progress Report

Reporting Period: 07/01/2004 through 09/30/2004

DOE Award No: DE-FC26-02NT41421

Date: November 2004

Submitted by:

Universal Aggregates LLC
300 Bursca Drive
Suite 303
Bridgeville, PA 15017

Roy Scandrol, P.E.

Disclaimer

“This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees makes a warranty, express or implied, or assumed any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.”

Abstract

This quarterly report covers the period from July 1st, 2004 through September 30th, 2004. It covers: technical development, permitting status, engineering status, construction status, operations summary and marketing support activities for this period.

Table of Contents

	<u>Page</u>
Abstract	i
Executive Summary	ii
I) Experimental	1
II) Results and Discussion	1
III) Conclusion	3
IV) References	3

Executive Summary

Plant startup, including equipment and system debugging, is underway. Minor adjustments to the SDA feed system, pug mill, and extruder were completed. Testing of admixtures to prevent the wetted SDA from sticking is continuing. The power plant is implementing a lime optimization program to reduce the calcium hydroxide values in the ash.

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

Hydrated lime content in the SDA was identified as an important factor that influences extrusion performance. SDA with hydrated lime content above 24% was difficult to extrude at the Birchwood plant, due to increased stickiness of the wetted ash. Several continuous extrusion runs with a 2” straight die were conducted successfully using SDA with hydrated lime content below 24% between 7/07 and 7/09. However, extruded products were crumby with fractured pieces comprising over 50% of the material. Addition of silica sand and gypsum in the mix feed and reduction of mix feed temperature did not improve the extrusion performance. Hydrated lime content in the SDA increased above 24% after 7/13, due to a switch to low sulfur and low ash coals at the Birchwood Power Plant (BPP). In early September, BPP implemented a spray dryer modification program for lime optimization, which could reduce hydrated lime content in the SDA. Reduction in hydrated lime content in the SDA to 24% and below was observed in late September. Hydrated lime content in the SDA was monitored twice a day for quality and process control.

Extrusion tests with Birchwood SDA were conducted using the VAN HO NL-320 10 HP extruder at the Bridgeville PA testing facility on 7/27 and at Birchwood aggregate production plant on 8/03. The objective was to evaluate the feasibility of producing extruded products with high hydrated lime containing SDA (above 26%), which showed difficulty in processing through the J. C. Steele (JCS) extrusion equipment at the Birchwood production plant. The VAN HO extruder had been used previously in bench-scale aggregate production and pilot plant continuous aggregate production operation. Test results indicated that it is possible to produce extruded products from SDA, which cannot be produced through the JCS extruder, even without an extrusion die installed. A meeting was held with representatives from JCS to discuss differences in JCS and VAN HO extruder designs and how to improve extruder and pugmill performance at the Birchwood aggregate production plant on 8/03. Several modifications were implemented in August and September.

Properties of wetted ash, collected at the pugmill outlet, were monitored after pugmill modifications. Better ash densification with reduced moisture content was achieved by increasing pugmill speed and dam outlet height, installing higher pressure water pumps, changing blade position, and adding a bridge in the center of pugmill. Several admixtures were evaluated as an extrusion aid to improve extrusion performance. Three admixtures were identified, which can produce extruded products with improved plasticity and reduced moisture content. The improvement

in extrusion performance was confirmed both with VAN HO and JCS extruders. The JCS extruder was modified by installing porcelain enameled auger and reversed liners for extrusion. Several continuous extrusion runs with a 2" straight die installation were conducted successfully at Birchwood in late September. Extruded products with structural integrity were produced with few fractured pieces.

B) Permitting

The pollution prevention plan for the plant was updated.

C) Engineering

Modifications to the pug mill (speed increase, elevated outlet and mid bridge) were completed. A new liner for the extruder and water filtration were designed and procured.

D) Construction

The berm around the storm water pond was elevated to design requirements and seeded. A porcelain enameled auger was installed in the extruder.

E) Marketing Support

Continued personal contact with trucking companies for hauling service needs in both aggregate pick up and delivery, and contingency plan hauling.

Regular, weekly communication conducted with contract customer regarding status of plant startup. Work with product customer to establish scale ticket for aggregate purchase and distribution. Established "customer list" for lightweight aggregate product and beneficial use application. Incorporated the "customer list" into automated truck scale for product tracking and future invoice records.

Repeated crushing and screening with conventional, coarse lightweight aggregates (3/4" nominal) used to charge curing vessel. The equipment produced an aggregate gradation passing ASTM specifications for lightweight aggregate in concrete masonry. The "reprocessed" (crushed and screened) aggregates were supplied to a local concrete masonry producer and conventional lightweight concrete masonry block were produced.

Continue visitation and personal contact with several local landfills in evaluation of possible beneficial use contingency plans (landfills within 100 miles of Birchwood facility). Conducted successful "demonstrations" for the beneficial use of fixated/conditioned spray dryer ash in road base course, and alternate daily cover applications with two other municipal solid waste landfills. Supplied materials (fixated SDA) for a mulch production pad sub-base, and a haul road sub-base. One landfill continues to utilize the fixated SDA, (regularly) for beneficial use applications in haul road sub-base, and as alternate daily cover. Continue to establish plans for similar beneficial use applications with the three landfills currently expressing interest to utilize the materials.

Continue to assist process startup, process and product testing, admixtures, and communication with potential product consumers.

F) Operations Summary

We continue to staff and operate 24 hours a day. We are currently working through revision 3 for the extruder dye and are making preparations to integrate the plant with green extrudates into the curing vessel. We continue to have a weekly safety meeting and we are currently looking for additional manpower to staff the plant, specifically: mechanic, electrician, and operating technicians.

Universal Aggregates continues with complete ash processing and disposal responsibilities.

G) DOE

The Quarterly Progress Report was submitted for the third quarter of 2004.

- 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.