

QUARTERLY PROGRESS REPORT

June 1, 2018 - August 31, 2018

PROJECT TITLE: Research Advances on the Use of Solid Wastes in Concrete and Asphalt

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COMPLETION DATE: August 31, 2018 **PHONE NUMBER:** 352-392-0846

PROJECT WEBSITE: <https://www.essie.ufl.edu/home/townsend/research/bu/research-advances-on-waste-in-concrete--asphalt/>

Work accomplished during this reporting period:

During this time period, monitoring continues for portland cement concrete made using unwashed and washed WTE ash as a partial coarse aggregate replacement along with glass powder as a supplementary cementitious material (SCM). To date, these bars have shown no indication of deleterious alkali-silica reaction.

Additionally, a literature review of WTE ash washing treatments is in progress. Washing has been found to be efficient in removing soluble chlorides as well as most heavy metals; it has been performed as a pretreatment before further treatment methods or other management options. Both contact time and liquid-to-solid ratio (L/S) are important washing parameters that can influence the removal efficiency of contaminants. Optimum washing parameters must be determined to guarantee the high removal efficiency of pollutants. These must also involve a reasonable and practical washing duration as well as limited water consumption to prevent the generation of large amounts of wastewater that would increase treatment costs and environmental impacts. Numerous works have investigated different washing parameters and found that contact time does not have a big influence on the removal of chlorides and sulfate, while L/S of 10 should be enough to remove most of the chlorides and minimize heavy metal leaching. However, most research articles ignored the impact that the liberation of fines attached on the surface of coarser ash particles may have on pollutant leachability. Since fine particles contain relatively more heavy metals and chlorides than coarser material, the removal of fines can contribute more to the removal of contaminants than the dissolution of soluble constituents during washing.

Based on the literature review, UF researchers also developed their washing experiments.

Different L/S and contact times will be explored to investigate the optimum washing condition for different targeted constituents. Instead of filtering ash and water mixture right after washing, the solution will be sieved first to remove the liberated fines during washing. The mechanisms of removal for each individual contaminant as well as the treatment cost of wastewater generated will also be examined.

Work planned for the next reporting period:

UF researchers will continue the development of the washing experimental design and conduct washing processes to identify the optimum washing conditions for different reuse applications. The washed ash will be utilized in asphalt concrete, and the properties and performance of the washed ash-amended product will be compared to that made from unwashed ash. The cost of this ash washing scenario will be compared to a “without washing” scenario to evaluate the economic feasibility of ash washing.

TAG Meetings:

No Technical Awareness Group (TAG) meetings were planned for this period.

Metrics:

- *Graduate Students:*

Name	Rank	Department	Professor	Institution
Kyle Clavier	PhD Student	Environmental Engineering	Timothy Townsend	University of Florida
Yalan Liu	PhD Student	Environmental Engineering	Timothy Townsend	University of Florida
Chad Spreadbury	PhD Student	Environmental Engineering	Timothy Townsend	University of Florida

- *Undergraduate Students:*

Name	Rank	Department	Professor	Institution
Brian Cochran	Undergraduate Research Assistant	Civil Engineering	Timothy Townsend	University of Florida
Mohamad Shawar	Undergraduate Research Assistant	Civil Engineering	Timothy Townsend	University of Florida
Sharez Sohail	Undergraduate Research Assistant	Environmental Engineering	Timothy Townsend	University of Florida
Thomas LeBlanc	Undergraduate Research Assistant	Environmental Engineering	Timothy Townsend	University of Florida

- *Research publications resulting from THIS Hinkley Center project: **None.***
- *Research presentations resulting from (or about) THIS Hinkley Center project: **None.***
- *Who has referenced or cited your publications from this project: **None.***
- *How have the research results from THIS Hinkley Center project been leveraged to secure additional research funding? What additional sources of funding are you seeking or have you sought? **None.***
- *What new collaborations were initiated based on THIS Hinkley Center project? **None.***
- *How have the results from THIS Hinkley Center funded project been used (not will be used) by the FDEP or other stakeholders? **None.***