

**RESEARCH PROBLEM STATEMENT**

<b>DATE:</b> 9/6/2018	<b>PROJECT AREA:</b> Materials
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**TITLE:** Influence of Powder Activated Carbon (PAC) in Fly Ash on the Properties of Concrete

**PROBLEM STATEMENT:**

Ready-mix concrete contractors routinely use Class C Fly Ash (CFA) as a supplementary cementitious material (SCM) in producing concrete. It is used as a partial replacement of Ordinary Portland Cement (OPC). Thus, the CFA must meet certain ASTM requirements (e.g., carbon content, loss of ignition) before it can be used in producing concrete. However, ArDOT is concerned about some CFAs as they contain power activated carbon (PAC), which creates adverse impacts on the target air voids and post-construction durability of air-entrained concrete. The PAC in fly ash increases the demand of the air-entraining agent (AEA) used to achieve specified air content. A higher amount of large entrained air bubbles due to the addition of CFA can lead to the reduction in the volume of the entrained air bubbles over a period of time. The degree of coalescence of air bubbles can be reduced by careful selection of the AEA and the mixing procedure. Alternatively, the unburned carbon can be reduced or removed by a high-temperature burnout or separated physically. To separate carbon from ash, additional steps such as froth flotation process can be adopted.

**OBJECTIVES:**

The primary objective of this proposed research project is to assess the influence of PAC in fly ash in properties of concrete. Specific objectives of this study are: (1) Quantify the PAC in fly ash originated from selected sources; (ii) Evaluate the impacts of PAC-containing fly in air-entrained concrete; (iii) Develop guidelines in controlling PAC in fly ash; and (iv) Suggest appropriate tool(s)/technique to reduce PAC in fly ash.

**FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:**

Potential implementations of this project are recommendations for changes the ArDOT' quality control guidelines so that the adverse effects of PAC containing fly ash in air-entrained concrete are minimized. The main benefit of this project is to control PAC in fly ash while preparing concrete. Transportation agencies are expected to save a significant amount of taxpayers' money by using fly ash while maintaining quality concrete.

**Estimated Project Duration:** 24 Months  
**PREPARED BY:** Zahid Hossain  
**AGENCY:** Arkansas State University  
**PHONE:** 870-680-4299 **REVIEWER:** William Caster

Standing Subcommittee  
Ranking

7/7

Advisory Council  
Ranking

31/37

Statement Combined with  
Statement Number(s)