

Sampling and Experimental Plan of Characterizing Combined Ash from the West Pasco Landfill

Prepared for:

Pasco County Utilities
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1.0 Project Objectives

Pasco County wishes to evaluate the potential for the beneficial use of ash currently contained in its West Pasco lined landfill units. The County is currently in the preliminary phases of exploring mining material from the existing ash monofill cells, extracting ferrous and non-ferrous metals, and screening/processing the ash to produce a mineral product for recycling. If technically, environmentally, and economically feasible, the County may wish to proceed with a larger scale landfill reclamation and ash recycling project (which would be subject to necessary permitting requirements). The proposed end-uses for the mineral fraction of the recovered ash would likely be similar to what is currently allowed for bottom ash recycling within the county. The material contained within the County's monofills consists of combined ash, however, so appropriate environmental and geo-mechanical characterization is necessary. This document outlines the sampling approach and experimental tests to be conducted to characterize the ash from the West Pasco landfill. The work proposed here does not require any modification to the site's operating permit.

2.0 Sampling Approach

The Pasco County RRF began operation in February of 1991. The monofilled ash represents 24 years of material. As ash characteristics may have changed over time with the evolution of waste stream components and changing plant operating conditions, and since aging of ash has been demonstrated to affect pH and leachability characteristics, samples of different ages will be collected and tested. A sampling plan has been developed to evaluate variations in the total element content and leachability as a function of ash depth and age.

Ash samples will be collected by boring into the landfill with a drill rig and removing the cuttings from a solid-shaft open-flight auger. Samples will be collected over a depth of 30 feet and stored in sealed, nitrogen-purged 5-gallon buckets to prevent aging. A subsample of cuttings will be collected from each of the drill locations every 10 ft in depth to evaluate variations in pH, composition, and leachability. Prior to any leach testing, the collected material will be mixed to create a composite sample representing each monofill bore (e.g., 8 different samples will be created). It is estimated that a 6-inch auger will produce over 450 lbs of material. The entirety of this material will be collected and transported to the University of Florida for laboratory testing.

A photo of the site layout at the West Pasco ash monofill is presented in Figure 1. The site has four ash cells: cells A-1 through A-4. Ash cell A-1 operated from Feb 1991 to Nov 1996, cell A-2 operated from Dec 1996 to April 2003, cell A-3 operated from May 2003 to April 2011, and cell A-4 is currently active and began receiving waste in May 2011. Aerial photographs, waste disposal records, and interviews with

County landfill personnel were used to estimate the age of the waste spatially within each cell.

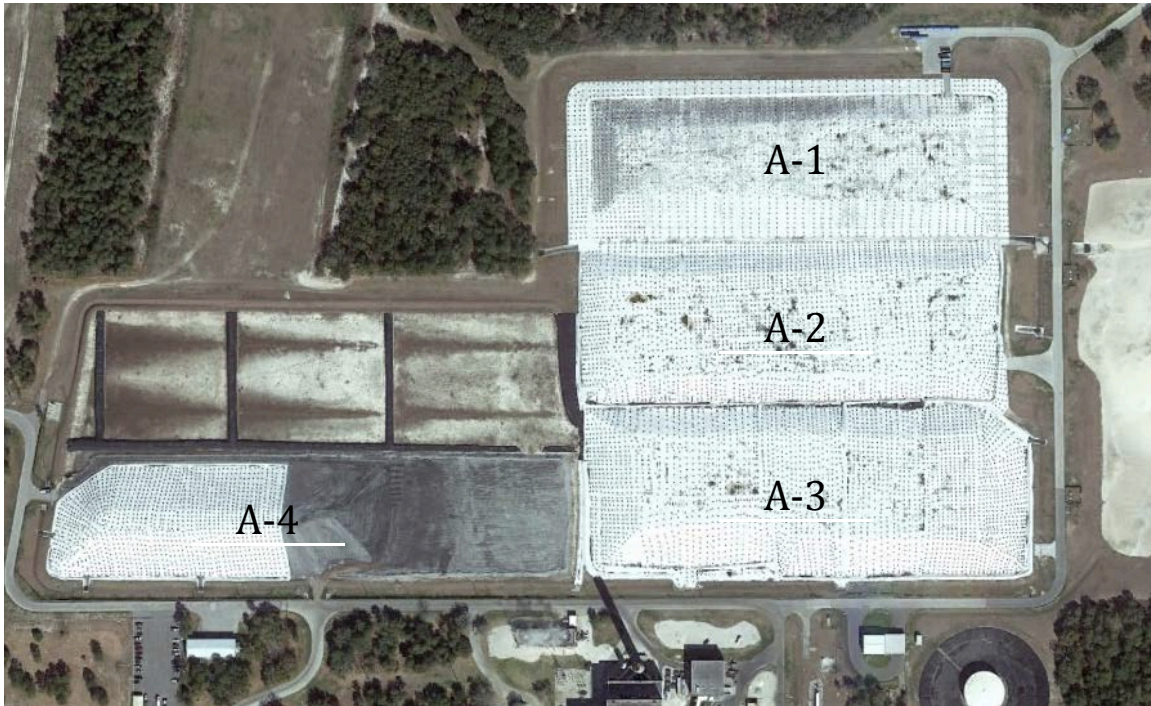


Figure 1: Aerial View of Monofill Cells at the West Pasco Landfill

Monofill borings will be taken at 8 different locations within the ash cells. These locations were developed to ensure that the ash samples were representative of a wide age range. The sampling locations and estimated ash ages are presented in Table 1. The approximate age of the ash being sampled was determined using the county's reported tonnage data. The volumes of each of the cells (and associated sub-cells created as part the site's filling operation) were approximated and the tonnage data used to estimate the age of the ash in cells A-1 through A-3. Dates and locations of waste placement for Cell A-4 were estimated using the county's Capacity and Site life calculations and the associated topographic surveys.

Table 1: Monofill Bore Locations

Cell	Location	Estimated Age Range
A-1	Center of Sub-Cell 1	Feb 1991- July 1992
A-1	Center of Sub-Cell 2	Aug 1992 – Nov 1993
A-1	Center of Sub-Cell 3	Dec 1993 – March 1995
A-2	Center of Sub-Cell 1	Dec 1996 – July 1998
A-2	Center of Sub-Cell 3	Dec 1999 – June 2001
A-3	Center of Sub-Cell 1	May 2003 – Jan 2005
A-3	Center of Sub-Cell 3	Jan 2007 – Nov 2008
A-4	Center of Sub-Cell 1	May 2011 – Jan 2013

Figure 2 provides a schematic of the test bore locations for cell A-1 (which is typical of operation for the other cells). Test bores will be retrieved at the estimated center of the sub-cell being sampled. Critical importance will be placed on preventing any damage to the landfill’s liner and leachate collection system. All drilling activities will be supervised by University of Florida research personnel along with representatives from the County. The depth to the liner system has been determined to exceed 30 ft in all instances and no more than six 5-ft drill stems will be taken on to the landfill during drilling. All drilling activities will be set to stop no less than 10 ft above the top of the leachate collection system. The drift stems added will be verified by the UF staff. Monofill bores will be taken by drilling through the intermediate cover system on the inactive cells and sub-cells; following completion of the boring the intermediate cover system will be repaired by the county’s contractors as part of their existing operating plan.

3.0 Experimental Approach

Characterization of material collected from the landfill will follow a two phase approach. Phase 1 will involve the sampling and testing of ash samples from multiple points within the monofill. This would include testing on the “as-recovered” ash as well as ash which had been screened into different size fractions which are designed to represent sizes that will be used as a construction aggregate. The phase 2 testing will use the data from phase one to develop one or more ash products, optimized to reduce leachability, for a more detailed leaching characterization using US-EPA’s LEAF. It is envisioned that the phase 2 data will be used in support of any of Pasco’s beneficial use decision making efforts.

Samples of ash will be collected from each of the four ash cells (referred to as cells), screened into discrete size fractions, and evaluated for total element content as well as leachability. Additionally, a sample of fresh combined ash produced at the operating resource recovery facility will be collected for comparison leach testing using EPA method 1316, a batch leaching at a liquid to solid ratio (L/S) of 10. This will allow the researchers to evaluate the aging effects of the material when contained in the monofill. Samples of the ash will be tested for pH and leachability at every 10 ft of sampling depth using EPA method 1316 (L/S10).

After sampling, the ash will then be screened into different size fractions for further testing. The intent of this screening is to prepare fractions suitable for use as a construction aggregate. The particle size fractions developed will encompass gradations that would typically be used for coarse aggregates and roadway bases. An unscreened sample of the ash will be maintained for comparison testing; the unscreened fraction of the ash will be subject to the same leach tests and total concentration analysis as the size separated fractions. The relative mass of each fraction, along with the mass of identifiable oversized materials, will be measured and recorded.

EPA Method 3050b (a total environmentally available digestion) will be conducted on each of the ash fractions as well as the unscreened samples.

The researchers will use the data from the initial baseline leaching evaluation to determine the optimum use and processing conditions for the Pasco County monofill ash. These data will allow for a leaching evaluation of the monofilled ash as a function of pH, age, and particle size. Optimal use and processing conditions could include some or all of the following: blending or further aging of ashes to generate the optimum pH, screening and use of select size fractions, and incorporation of the ash into an asphalt or concrete product.

Following the initial testing, the researchers (along with the County) will meet with the FDEP to discuss the test results and the proposed beneficial uses. Based on feedback from this meeting, the research team will then develop a more detailed ash characterization plan (for the samples already collected) which will be used in support of proposed beneficial use decision making. Phase 2 testing would likely include a more detailed leaching characterization using one or more of the EPA LEAF tests, as well as testing of asphalt and concrete products produced with and without the Pasco County ash retrieved from the lined monofills.