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CLERK OF THE BOARD
OF COUNTY COMMISSIONERS
MIAMI-DADE COUNTY, FLORIDA

Memorandum

MIAMI-DADE COUNTY

Date: March 8, 2016

Agenda Item No. 8(M)(1)

To: Honorable Chairman Jean Monestime
and Members, Board of County Commissioners

From: Carlos A. Gimenez
Mayor

Subject: Resolution Authorizing Execution of the Research Service Agreement Between Miami-Dade County and the University of Florida to Determine the Suitability of Ash from the County's Resources Recovery Facility as a Substitute for Coal Ash in the Production of Cement

Resolution No R-213-16

Recommendation

It is recommended that the Board of County Commissioners approve the attached Research Service Agreement with the University of Florida to determine the suitability of ash from the County's Resources Recovery Facility (RRF) as a substitute for coal ash in the production of cement. If successful, this test may lead to the recycling of up to 85 percent of the ash produced at the RRF each year (approximately 140,000 tons).

Scope

The scope of work for the Research Service Agreement includes all sampling, testing, analyses, and reporting services necessary to determine the suitability of ash produced at the RRF as an alternative to coal ash in the production of cement. The impact is countywide.

Fiscal Impact/Funding Source

The proposed amount for the Research Service Agreement is $118,893.00, which is comprised of a base fee of $93,893.00 and a contingency of $25,000.00. Funding for services rendered under this Agreement will be drawn from Solid Waste System proprietary funds. In the event that the County receives regulatory approval for RRF ash recycling, ash landfill operating costs and long-term care costs may be reduced, and capital costs for landfill construction may be deferred significantly, dependent upon our ability to market the ash. The current annual operating cost for the ash landfill is approximately $322,181.00. The capital cost for the most recently constructed ash landfill cell was $5.19 million. At the current fill rate, this new cell is anticipated to reach capacity in 2032. Ash recycling could potentially extend this time frame by approximately 90 years.

Track Record/Monitor

This will be the first time the Solid Waste Management Department (SWM) has entered into an Agreement with the University of Florida. Lee Casey, Division Director for Technical Services and Environmental Affairs of SWM, will monitor this contract.

Background

The Miami-Dade RRF produces approximately 165,000 tons of ash per year. All of this ash is placed in a secure ash landfill that must be maintained and monitored in accordance with the State of Florida rules for at least 30 years after it is filled to its capacity and closed. Up to 85 percent of this ash (approximately 140,000 tons) may be suitable for recycling as an additive in the production of cement.

Coal ash is an essential ingredient in the production of cement. With the recent changes in air quality regulations worldwide, coal-fired power plants - the primary supplier of ash for cement manufacturing - are being closed down, making the ash feedstock scarce and more expensive to obtain. Local cement kilns report that coal ash is being imported from as far away as Italy to satisfy needs. Ash from coal-fired plants has higher levels of contaminants than ash from waste-to-energy (WTE) plants, such as the RRF; therefore, WTE ash may be a better alternative from an environmental perspective.

The SWM and its partners in this research, Covanta (RRF Operator) and Titan (a local cement manufacturer), are proposing to evaluate the use of RRF ash as a substitute for coal ash through a single day, full-scale pilot test. Covanta will provide up to 2,500 tons of ash and logistical support. Titan will dedicate a one-day cement production cycle at its local plant exclusively using the RRF ash. Additionally, Titan will monitor and evaluate the behavior of the ash during the cement production cycle.

The University of Florida, through its Hinkley Center for Solid and Hazardous Waste Research (Hinkley Center), will perform the testing, analysis, and evaluation of the cement and cement products produced from RRF ash, and will compare them to cement and cement products currently and commonly available in Florida. The Hinkley Center was created by the Florida Legislature to coordinate research by Florida universities on waste management issues requested by cities, counties, municipalities, and state agencies. The Hinkley Center is world-renowned for its research in emerging waste management strategies and technologies. The Hinkley Center recently concluded similar research studies for Hillsborough County that resulted in the approval of the use of ash from its WTE facility in roadbed and has reserved the same team of researchers to perform the work for this RRF project. The Florida Department of Environmental Protection (FDEP) has reviewed the concept and is supportive of the research approach. The proposed research service agreement and scope of work are attached.

There are a number of potential direct and indirect financial and environmental benefits that will accrue to the County should the RRF ash be approved by FDEP as a suitable coal ash substitute.

These benefits include:

- Lessening of the amount of ash requiring landfilling by about 85 percent;
- Extending the life of the existing ash landfill;
- Allowing for more capacity, thereby postponing the need for a new ash landfill;
- Increasing recycling to help reach the State adopted 75 percent recycling goal;
- Enhancing the protection of the environment since WTE ash has fewer contaminants than coal ash;
- Reducing the amount of greenhouse gases produced that are associated with transportation of ash since the WTE ash is locally produced; and
- Reducing the cost of building materials by avoiding importation of raw materials from other sources.

The following additional benefits will be realized if the previously landfilled ash can be mined and sold for cement production:

- Creating a new revenue source for the County;
- Reducing existing landfill footprint; and
- Reducing the long-term care costs associated with the ash landfill.

Alina T. Hudak
Deputy Mayor

MEMORANDUM

(Revised)

TO: Honorable Chairman Jean Monestime and Members, Board of County Commissioners

DATE: March 8, 2016

FROM: Abigail Price-Williams, County Attorney

SUBJECT: Agenda Item No. 8(M)(1)

Please note any items checked.

_____	**"3-Day Rule" for committees applicable if raised**
_____	**6 weeks required between first reading and public hearing**
_____	**4 weeks notification to municipal officials required prior to public hearing**
_____	**Decreases revenues or increases expenditures without balancing budget**
_____	**Budget required**
_____	**Statement of fiscal impact required**
_____	**Statement of social equity required**
_____	**Ordinance creating a new board requires detailed County Mayor's report for public hearing**
✓	**No committee review**
_____	**Applicable legislation requires more than a majority vote (i.e., 2/3's ____, 3/5's ____, unanimous _____) to approve**
_____	**Current information regarding funding source, index code and available balance, and available capacity (if debt is contemplated) required**

Approved _____ Mayor
Veto _____
Override _____

Agenda Item No. 8(M)(1)
3-8-16

RESOLUTION NO. R-213-16

RESOLUTION AUTHORIZING EXECUTION OF A RESEARCH SERVICE AGREEMENT BETWEEN MIAMI-DADE COUNTY AND THE UNIVERSITY OF FLORIDA IN THE AMOUNT OF $118,893.00 TO STUDY THE SUITABILITY OF USING ASH FROM THE COUNTY'S RESOURCES RECOVERY FACILITY AS A SUBSTITUTE FOR COAL ASH IN THE PRODUCTION OF CEMENT

WHEREAS, the County owns the Resources Recovery Facility (RRF) located at 6990 N.W 97th Avenue, Doral, Florida, which produces ash as a byproduct that must be disposed of in a lined landfill; and

WHEREAS, the ash produced at the RRF may be a suitable substitute for coal ash in the production of cement, thereby creating an opportunity to recycle the ash and eliminate the cost of disposal; and

WHEREAS, testing, evaluation and analysis are necessary to determine the feasibility of using this ash in cement manufacture; and

WHEREAS, the Hinkley Center of the University of Florida was specifically created by the Florida Legislature to perform such research and has conducted similar research for another county,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that the Mayor or Mayor's designee is authorized to execute the attached Research Service Agreement between Miami-Dade County and the University of Florida in the amount of $118,893.00 to determine the suitability of ash from the County's Resources Recovery Facility as a substitute for coal ash in the production of cement in substantially the form attached hereto. The Mayor or designee is authorized to exercise any and all powers within the Agreement including termination.

The foregoing resolution was offered by Commissioner **Sally A. Heyman**, who moved its adoption. The motion was seconded by Commissioner **Barbara J. Jordan** and upon being put to a vote, the vote was as follows:

Jean Monestime, Chairman	**aye**		
Esteban L. Bovo, Jr., Vice Chairman	**absent**		
Bruno A. Barreiro	**aye**	Daniella Levine Cava	**aye**
Jose "Pepe" Diaz	**aye**	Audrey M. Edmonson	**aye**
Sally A. Heyman	**aye**	Barbara J. Jordan	**aye**
Dennis C. Moss	**aye**	Rebeca Sosa	**absent**
Sen. Javier D. Souto	**aye**	Xavier L. Suarez	**aye**
Juan C. Zapata	**aye**		

The Chairperson thereupon declared the resolution duly passed and adopted this 8th day of March, 2016. This resolution shall become effective upon the earlier of (1) 10 days after the date of its adoption unless vetoed by the County Mayor, and if vetoed, shall become effective only upon an override by this Board, or (2) approval by the County Mayor of this Resolution and the filing of this approval with the Clerk of the Board.

MIAMI-DADE COUNTY, FLORIDA
BY ITS BOARD OF
COUNTY COMMISSIONERS

HARVEY RUVIN, CLERK

By: **Christopher Agrippa**
Deputy Clerk

Approved by County Attorney as
to form and legal sufficiency. D.F.

Daniel Frastai

Research Service Agreement

Between

Miami-Dade County

and the

University of Florida

THIS AGREEMENT is made by and between the University of Florida, (hereafter referred to as "UF"), whose address is 219 Grinter Hall, University of Florida, Box 115500, Gainesville, FL 32611 and Miami-Dade County (hereafter referred to as "SPONSOR"), whose address is 111 NW 1st Street, Miami, Florida 33128.

WHEREAS, SPONSOR is a local government and political subdivision of the State of Florida;
WHEREAS, SPONSOR desires to retain the services of UF, upon the terms and conditions hereinafter set forth;
WHEREAS, SPONSOR owns a Waste-to-Energy plant that produces ash as a byproduct;
WHEREAS, coal ash is an essential ingredient for the manufacture of cement;
WHEREAS, coal fired utility plants are slowly being closed throughout the United States causing coal ash to become a scarce commodity;
WHEREAS, ash from Miami-Dade County's Waste-to-Energy plant, is landfilled and not otherwise reused;
WHEREAS, if ash from Miami-Dade County's Waste-to-Energy plant is a suitable substitute for coal ash, approximately 85% of the ash produced could be reused instead of being disposed of in a landfill; and
WHEREAS, SPONSOR desires to determine if the Waste-to-Energy plant ash is a suitable substitute for coal ash; advance the state of the science to recycle the ash byproduct into useful products; advance its own legislated sustainability objectives and use this additional method to help meet the 75% recycling goal established by the State of Florida.

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein, SPONSOR and UF agree as follows:

1. Scope of Service to be Performed: UF agrees to undertake and conduct the work entitled; **"Evaluate the Use of Waste to Energy Bottom Ash from the Miami-Dade Renewable Energy Facility as a Kiln Feed Component in the Manufacture of Portland Cement"** for SPONSOR as outlined in **Exhibit A.**

2. Period of Service: The research services called for by Article 1 may begin on December **1, 2015** with activities ending on November **30, 2016,** unless extended by written amendment or terminated sooner following the termination provisions set forth below.

3. Fixed Fee and Payment: SPONSOR agrees to pay UF a total not-to-exceed fee in the amount , $118,893 which includes a base fee of $93,893 and a contingency of $25,000 for research services to be provided under this agreement in accordance with the following schedule and receipt of UF invoice based on the percent completion of each task:

   - Task 1 – Testing /Sampling Plan - **$16,893**
   - Task 2 – Collection/Testing of Bottom Ash - **$15,000**
   - Task 3 – Collection/Testing of Control, Bottom Ash-Amended Cement, and Cement Products - **$35,000**

- Task 4 – Signed and Sealed Final Report - $27,000
- Task 5 - Contingency – $25,000

The Contingency is intended to fund supplemental related research that may present itself during the course of the scoped investigation and cannot be used without the prior, written approval of SPONSOR's Point of Contact.

The Payment shall be made to "University of Florida" and remitted to the following address:

Office of Contracts and Grants
123 Grinter Hall
PO Box: 113001
Gainesville, FL 32611-3001

4. Points of Contact: The following are designated as Investigators and Administrative contacts for the purposes of this Agreement. The Investigators will be responsible for the technical matters of the research services outlined in Exhibit A. The UF Investigator is essential to the work being performed and no change to the UF Investigator is allowed without the SPONSOR's written approval.

Investigators:

For UF: Timothy Townsend, Professor
Engineering School of Sustainable Infrastructure & Environment
333 ENG, PO Box 116450
Gainesville, FL 32611
352-392-0846 ttown@ufl.edu

For SPONSOR: Paul Mauriello - Deputy Director
2525 NW 62 Street
Miami, FL, 33147
305-514-6666 mauriel@miamidade.gov

Administrative:

For UF: Brian Prindle, Associate Director of Research
Division of Sponsored Research
219 Grinter Hall
PO Box 115500
Gainesville, FL 32611-5500
(352) 392-1582 ufproposals@ufl.edu

For SPONSOR: Lee Casey - Sr. Division Director
2525 NW 62 Street
Miami, FL, 33147
305-514-6670 le1@miamidade.gov

5. **Reporting Requirements:** In addition to research services as described by Article 1, UF Investigator shall deliver the following reports to the SPONSOR's Investigator Point of Contact:

Report Type	Due
Quarterly Status Report	Every 3 Months until contract completion
Draft Final Report	Fifteen (15) days before Contract End date
Final Signed & Sealed Report	No later than 1 Month from Contract End date

These narrative reports should provide an assessment of what has been accomplished during the reporting period with the final report covering the entire Subcontract period.

6. **Confidential Information:** All unpublished written data and information provided by SPONSOR to the UF Investigators in connection with this Agreement ("Confidential Information") is confidential and/or proprietary to the SPONSOR and UF Investigators shall not publish or disclose Confidential Information to a third-party or use Confidential Information for any purpose but to render the Research Services, without the prior written consent of SPONSOR.

The obligations of non-use and non-disclosure shall not apply to information which:

a) at the time of receipt by a UF Investigator is in the public domain; or

b) after its receipt by a UF Investigator is made public by a third party, unless such publication was improper; or

c) was in the possession of a UF Investigator before receipt from SPONSOR or as evidenced by written documentation was developed independently or acquired directly or indirectly from a source wholly independent of the SPONSOR.

d) is the subject of a valid subpoena or is otherwise required by law to be disclosed

In the event of (d) above UF is required to give SPONSOR prompt notice thereof so that SPONSOR may seek an appropriate protective order prior to such required disclosure. UF will reasonably cooperate with SPONSOR in its efforts to seek such a protective order.

The obligations of this Article pertaining to confidentiality shall survive the termination or expiration of this Agreement for a period of five (5) years.

7. **Publications:** SPONSOR recognizes that UF Investigators must have the ability to publish research findings, results or otherwise information gained in the course of research services performed under this agreement in scholarly journals, student dissertations, or other professional forums not so mentioned.

In order to give the SPONSOR an opportunity to review and advise regarding loss of intellectual property and/or to identify any inadvertent disclosure of SPONSOR Confidential Information, UF will submit to SPONSOR copies of any proposed publication or presentation material involving the results of the Research Services at least thirty (30) days in advance of the submission date for publication or planned presentation date.

SPONSOR recognizes that timing is of the essence and the review of such materials shall be completed within 30-days from the receipt of the planned publication or presentation. UF agrees to delete information identified by SPONSOR as Confidential Information from any such proposed publication or presentation material unless SPONSOR agrees to allow its release. If SPONSOR does not respond within the thirty (30) days, said Researchers will have the right to publish the results without further notification or obligation to Sponsor.

At the request of the SPONSOR, UF will agree to delay publication or presentation of materials submitted by up to another 30-days (or longer if mutually agreed upon) to allow for preparation and filing of a patent application which SPONSOR has the right to file or to have UF file at SPONSOR's request.

8. Inventions and Patents:

   a) No license to the other Party under any patents is granted or implied by conveying Proprietary or other Information to that Party.

   b) If an invention is conceived exclusively by the employees of one Party in connection with the Project, title to said invention and to any patent issuing thereon shall be in the inventing Party's name.

   c) In the case of joint inventions, that is inventions made jointly by one or more employees of both Parties hereto, each Party shall have an equal, undivided interest in and to such joint inventions.

   d) SPONSOR retains a first option, for consideration, a non-exclusive or exclusive license with a right to sublicense, on terms and conditions to be mutually agreed upon. The option shall extend for a time period of 90 days from the date of disclosure to SPONSOR.

9. Use of Name for Publicity: Neither Party shall use the name of the other Party or of any Investigator in any advertising or promotional material without the prior written approval of the other.

10. Compliance with Law: The Parties shall comply with all applicable federal, state, local laws and regulations and nothing in this Agreement shall be construed to require either Party to violate such provisions of law or subject either Party to liability for adhering to such provisions of law.

11. Independent Contractor: UF shall be deemed to be and shall be an independent contractor and, as such, UF shall not be entitled to any benefits applicable to employees of Sponsor; Neither Party is authorized or empowered to act as agent for the other for any purpose and shall not on behalf of the other enter into any contract, warranty, or representation as to any matter. Neither shall be bound by the acts or conduct of the other.

12. Insurance: In the performance of all services hereunder:

   a) UF warrants and represents that UF has adequate liability insurance, such protection being applicable to officers, employees, and agents while acting within the scope of their employment by UF, and UF has no liability insurance policy as such that can extend protection to any other person.

   b) Each Party hereby assumes any and all risks of personal injury and property damage attributable to the negligent acts or omissions of that Party and the officers, employees, and agents thereof.

13. Termination: This Agreement may be suspended or terminated at any time by UF or SPONSOR by giving written notification to the appropriate Administrative Contact of the other Party.

In the event that either Party shall be in breach, violation or default of any of its obligations under this Agreement and shall fail to remedy such default within sixty days (60) after receipt of written notice thereof, the Party not in default (reserving cumulatively all other remedies and rights under this Agreement and at law and in equity) shall have the option of terminating this Agreement upon written notice thereof.

Upon any termination hereof, UF shall issue a final report that summarizes the progress made hereunder. UF shall be reimbursed for all non-cancelable costs incurred in the performance of this Agreement; such reimbursement shall not exceed the total amount set forth by Article 3.

14. Dispute Resolution: Any dispute concerning performance of the Agreement shall be decided by the appropriate administrative officials of each party, who shall reduce any decision to writing. In the event of an impasse, the parties may pursue any available remedies in law.

15. Miscellaneous: This Agreement (a) may not be assigned or transferred by UF without SPONSOR's prior written consent, (b) constitutes the entire understanding of the Parties with respect to the subject matter hereof, and (c) may be modified or amended only in a writing signed by duly authorized representatives of both Parties.

16. Entire Agreement: This Agreement with its exhibits constitutes the entire agreement between the Parties and supersedes and replaces any and all previous understandings, commitments, or agreements, whether oral or written, relating to the performance of this Agreement.

IN WITNESS WHEREOF, the Parties have caused this agreement to be executed by their duly authorized representatives.

SPONSOR	UNIVERSITY OF FLORIDA
_____	_____
Signature (authorized representative)	Signature (authorized representative)
_____	Brian Prindle Associate Director of Research
Title	Title
_____	11/23/15
Date	Date

Approved as to form
and Legal Sufficiency

Assistant County Attorney

12/8/15
Date

"Exhibit A"

Proposed Plan of Testing to Evaluate the Use of Waste to Energy Bottom Ash from the Miami-Dade Renewable Energy Facility as a Kiln Feed Component in the Manufacture of Portland Cement

The Miami-Dade County Department of Public Works and Waste Management has expressed their interest to beneficially use waste to energy (WTE) bottom ash from the Miami-Dade Resource Recovery Facility (RRF) in Doral, FL as a component of the cement kiln feed at the Titan Pennsuco kiln in Medley, FL. WTE fly ash will not be examined as part of this effort. The Titan kiln is located approximately 5.5 miles north of the Miami-Dade RRF. The WTE bottom ash contains ferrous and non-ferrous metals, and other minerals that are valuable in the manufacture of Portland cement. The following experimental methodology has been developed to assess potential differences in total element concentration and leachability in bottom ash amended-cements and cement products. A proposed plan of testing has been developed that includes four tasks described in detail below:

Task 1: Develop and Submit Testing and Sampling Pan

A formal sampling plan and list of tests to be conducted on the bottom ash, ash-amended and control cements, and cement products will be developed based on dialogue with the FDEP (Department). Portland cement concrete and mortar specimens will be produced using mix designs developed through conversations with the Department and will be representative of many of the cement products that could potentially be produced using the cement generated at the Titan Pennsuco facility. Mortar specimens (comprised of cement and sand without any course aggregate) would contain a higher percentage of cement than most concrete mixes and are considered to be a conservative means for evaluating element release from cement-based products. However, based on the large number of potential applications for cement, these designs would not encompass all of the potential mixes or applications for the cement produced at the facility. After a consensus agreement has been reached by all parties, the testing plan will be submitted to the FDEP for feedback.

Task 2: Collection and Testing of Bottom Ash

Bottom ash will be used as a replacement for coal ash in the cement production process on a trial basis. This ash will be stockpiled for a period of multiple weeks at the Miami-Dade RRF landfill. Sufficient bottom ash will be stockpiled to allow a 24-hour test period during which ash is utilized as kiln feed. Prior to the test, representative samples of the bottom ash will be collected from the stockpile for baseline characterization. The ash will be sampled following the procedures outlined in the US EPA's SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (Chapter Nine – Sampling Plan)*. The goal of this is sampling is to provide a sufficient number of samples to meet the intent of accepted ash characterization protocol (e.g., US EPA's *Guidance for the Sampling and Analysis of Municipal Waste Combustion Ash for the Toxicity Characteristic* (EPA Pub No. EPA530-R-95-036)). This is the standard sampling procedure used for the characterization of WTE ash with respect to its status as a

hazardous waste. The sample will be used to characterize the hazardous waste status of the bottom ash tested, as well as determine the bulk and trace element forms present in the material.

TCLP testing for RCRA metals (As, Ag, Ba, Cd, Cr, Se, Hg, Pb) and total concentration testing on an expanded suite of samples will conducted on each of the ash samples collected. XRD analysis will be conducted a composite sample created from the individual samples. Total concentration and XRD analysis will be performed to quantify the bulk and trace elemental forms present in the bottom ash. This data may be used to better understand any potential differences in the ash amended and control cements.

Sample: Miami-Dade RRF Bottom Ash	
Test	**Method**
Toxicity Characteristic Leaching Procedure (TCLP)	EPA Method 1311
Total Elemental Concentration	EPA Method 3050b
Bulk Mineral Composition Through X-Ray Diffraction	ASTM C1365: Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis

Task 3: Sampling and Testing of Control and Bottom Ash-Amended Cement and Cement Products

The Portland cement produced during the 24-hour test at the Titan Pennsuco facility will be characterized along with a control sample of cement produced without bottom ash (using coal ash). A representative sample of the ash-amended cement product will be collected over the duration of the time in which the ash-amended cement is produced. To provide a basis for comparison, a set of cement control samples will be obtained from commercially available cement manufactured by the different cement kilns in Florida. Bulk and trace elemental analysis will be conducted on the ash-amended and control cements to evaluate if the addition of the WTE bottom ash results in substantial differences in the trace element content of the cement and the mineral forms present.

The following tests will be conducted on the ash-amended and the control cements:

Materials: *ash-amended cement, and control cement*	
Test	**Method**
Total Elemental Concentration	EPA Method 3050b

Bulk Mineral Composition Through X-Ray Diffraction	ASTM C1365: Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis

To evaluate potential changes to the leachability of concrete and mortar specimens produced using the bottom ash-amended cement, concrete and mortar samples will then be produced using both the ash-amended and control cements (as indicated below). The mix designs used for the concrete and mortar specimens will be determined through dialogue with the Department, Miami-Dade County, Titan and The University of Florida. To quantify trace element release from the ash-amended and control concretes and mortars, these samples will be subjected to a series of leach tests. These tests will evaluate the leaching behavior of the concrete samples and mortar samples in their intact form as well as when they are crushed to assess leaching risks if the concrete is size-reduced for recycling or disposal. Total element concentration and SPLP will be conducted on mortars and concrete created individually from all of the control cements. EPA methods 1313, 1315, and 1316 will be conducted on mortars and concrete created using a composite cement blended from the individual control cements (blended on an equal-mass basis).

The following tests will be conducted on the ash-amended and control concretes and mortars:

Materials: *ash amended and control concrete and mortars*	
Test	**Method**
Total Elemental Concentration	EPA Method 3050b
Synthetic Precipitation Leaching Procedure (SPLP)	EPA Method 1312
Batch Liquid to Solid Ratio Test	EPA Method 1316
Monolith Leaching Test	EPA Method 1315
pH Static Leaching Test	EPA Method 1313

Task 4: Drafting and Submission of Signed and Sealed Final Report

Following completion of the tests listed in Tasks 3-4 the research team will submit a report to the Department outlining the results of the research described above. Additionally, an engineering use case analysis of the potential impacts of the use of the Miami-Dade bottom ash as a component of the cement kiln feed will be provided. Throughout this process a dialogue will be established with senior Department staff in order to ensure that appropriate criteria are being evaluated. Dr. Timothy Townsend P.E. (FL Reg. # 60283) and his staff will be responsible for any use case modeling efforts and drafting of the final report.

Project:	Miami Dade Ash Recycling

Principal Investigator	Weeks		Salary	Fringe		Total
PI: Townsend	3	$	9,911.14	$2,547.16	$	12,458
C-PI: Schert	3	$	8,332.80	$2,141.53	$	10,474
T Vinson	2	$	3,960.00	$1,017.72	$	4,978

Graduate Research Assistants	Weeks	FTE	Salary	Fringe	Tuition		Total
GRA	39	0.5	$18,750.00	$2,793.75	$8,480.59	$	30,024

OPS or Student Assistant	Hours	Hourly Rate	Salary	Fringe		Total
Undergraduate Student Assistant	500	10	$5,000.00	$130.00	$	5,130

Expenses			
Lab Expenses		$	10,000
Travel		$	2,050
Total Direct		$	75,115
Indirect	0.25	$	18,779
Total		$	93,893