Memorandum

MIAMI-DADE COUNTY

Date:	July 21, 2009
To:	Honorable Chairman Dennis C. Moss and Members, Board of County Commissioners
From:	George M. Burgess County Manager
Subject:	Resolution approving Joint Funding Agreement No. 09E0FL208019 between Miami-Dade County and the United States Geological Survey in the amount of $437,888

Agenda Item No. 8(R)(1)(A)

RECOMMENDATION

It is recommended that the Board of County Commissioners adopt the attached resolution approving Joint Funding Agreement (JPA) No. 09E0FL208019 between Miami-Dade County and United States Geological Survey (USGS) to complete hydraulic tomography testing at the County's North District Wastewater Treatment Plant as a condition of the operating permit issued by the Florida Department of Environmental Protection (FDEP) to operate the injection wells at the plant.

SCOPE

The impact of this agenda item is countywide.

FISCAL IMPACT/FUNDING SOURCE

The fiscal impact to the County is $437,888. The funding source is Miami-Dade Water and Sewer Department's (WASD) operating revenues.

TRACK RECORD/MONITOR

The WASD Deputy Director for Regulatory Compliance and Capital Improvements will monitor the implementation of this project.

BACKGROUND

FDEP issued WASD Permit Number 0057792-009-UO to operate four Class I Injection Wells that dispose of wastewater effluent at the North District Wastewater Treatment Plant. One of the various requirements of the operating permit includes the installation of a monitoring well to collect hydrogeologic data of the Floridan Aquifer.

On October 31, 2008, WASD and USGS staff met with FDEP to discuss the installation of the monitoring well. All three parties agreed that it would save time and be less expensive to revise the permit requirement of installing a monitoring well with the requirement of hydraulic tomography testing. Hydraulic tomography testing consists of a series of tests that will provide similar hydrogeologic data as the monitoring well would; however, it will save the County almost $2,000,000 in costs over the next three years.

Assistant County Manager

MEMORANDUM

(Revised)

TO: Honorable Chairman Dennis C. Moss and Members, Board of County Commissioners

DATE: July 21, 2009

FROM: R. A. Cuevas, Jr. County Attorney

SUBJECT: Agenda Item No. 8(R)(1)(A)

Please note any items checked.

_____ **"4-Day Rule" ("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**

_____ **Bid waiver requiring County Mayor's written recommendation**

_____ **Ordinance creating a new board requires detailed County Manager's report for public hearing**

_____ **Housekeeping item (no policy decision required)**

_____ **No committee review**

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Approved _____ Mayor
Veto _____
Override _____

Agenda Item No. 8(R)(1)(A)
7-21-09

RESOLUTION NO. _____

RESOLUTION APPROVING A JOINT FUNDING AGREEMENT BETWEEN MIAMI-DADE COUNTY AND UNITED STATES GEOLOGICAL SURVEY TO COMPLETE HYDRAULIC TOMOGRAPHY TESTING AT THE NORTH DISTRICT WASTEWATER TREATMENT PLANT IN MIAMI-DADE COUNTY AND REQUIRING THE MIAMI-DADE WATER AND SEWER DEPARTMENT TO FUND $437,888

WHEREAS, this Board desires to accomplish the purposes outlined in the accompanying memorandum, a copy of which is incorporated herein by reference,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that the County Mayor or his designee is hereby authorized, for and on behalf of Miami-Dade County, to execute the Joint Funding Agreement between Miami-Dade County and the United States Geological Survey, in substantially the form attached hereto, which requires the Miami-Dade Water and Sewer Department to fund $437,888; authorizing the County Mayor or Mayor's designee to exercise the provisions thereof.

The foregoing resolution was offered by Commissioner , who moved its adoption. The motion was seconded by Commissioner and upon being put to a vote, the vote was as follows:

Dennis C. Moss, Chairman
Jose "Pepe" Diaz, Vice-Chairman

Bruno A. Barreiro	Audrey M. Edmonson
Carlos A. Gimenez	Sally A. Heyman
Barbara J. Jordan	Joe A. Martinez
Dorrin D. Rolle	Natacha Seijas
Katy Sorenson	Rebeca Sosa
Sen. Javier D. Souto	

The Chairperson thereupon declared the resolution duly passed and adopted this 21st day of July, 2009. This resolution shall become effective ten (10) days after the date of its adoption unless vetoed by the Mayor, and if vetoed, shall become effective only upon an override by this Board.

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

HARVEY RUVIN, CLERK

By:_____
Deputy Clerk

Approved by County Attorney as
to form and legal sufficiency.

Henry N. Gillman

ORIGINAL

Form 9-1366
(Oct. 2005)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement

Customer #:	FL016
Agreement #:	09E0FL208019
Project #:	9/10-2080-?????
TIN #:	59-6000573
Fixed Cost Agreement	☑ Yes ☐ No

FOR
WATER RESOURCES INVESTIGATION

THIS AGREEMENT is entered into as of the 1st day of June, 2009, by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the MIAMI-DADE COUNTY, party of the second part.

1. The parties hereto agree that subject to availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation AN INVESTIGATION OF WATER RESOURCES REFERRED TO AS HYDRAULIC TOMOGRAPHY AND SEISMIC PROFILING AT THE NORTH DISTRICT WASTEWATER TREATMENT PLANT, herein called the program. The USGS legal authority is 43 USC 36C; 43 USC 50; and 43 USC 50b.
2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program. 2(b) includes In-Kind Services in the amount of $0.00.

		by the party of the first part during the period		
(a)	$0.00	June 01, 2009	**to**	September 30, 2011
		by the party of the second part during the period		
(b)	$437,888.00	June 01, 2009	**to**	September 30, 2011

(c) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.

(d) The performance period may be changed by mutual agreement and set forth in an exchange of letters between the parties.

3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.
4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.
5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.
6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.
7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.

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Page 2 of 2

Form 9-1366 continued	U.S. Department of the Interior U.S. Geological Survey Joint Funding Agreement	Customer #: Agreement #: Project #: TIN #:	FL016 09E0FL208019 9/10-2080-????? 59-6000573

8. The maps, records, or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records, or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at costs, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records, or reports published by either party shall contain a statement of the cooperative relations between the parties.
9. USGS will issue billings utilizing Department of the Interior Bill for Collection (form DI-1040). Billing documents are to be rendered **QUARTERLY**. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983).

U.S. Geological Survey
United States
Department of the Interior

MIAMI-DADE COUNTY

USGS Point of Contact

Name: R. Scott Padgett, Acting A.O.
Address: 3110 S.W. 9th Avenue
Ft. Lauderdale, FL 33315
DUNS #: 137784026/TAS: 149/00804
Telephone: 954.377.5906 OR 813.975.8620, ext. 138
Email: rspadgett@usgs.gov

Customer Point of Contact

Name: Virginia Walsh, P.G.
Address: 3071 S.W. 38th Avenue
Room 554-10
Miami, FL 33146
Telephone: 786.552.8266
Email: WALSHV@miamidade.gov

Signatures

By_____ Date 5/12/09
Name: Dr. Barry Rosen
Title: FISC Director

Signatures

By_____ Date_____
Name:
Title:

By_____ Date_____
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Title:

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Hydraulic Tomography and Seismic Profiling at the North District Wastewater Treatment Plant

A Proposal to the Miami-Dade Water and Sewer Department

Miami-Dade County, Florida

By the U.S. Geological Survey

Fort Lauderdale, Florida

Start Date: June 2009

End Date: September 2011

USGS Fee: $437,888

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Problem Statement

Florida Statute 403.086(9) finds that "elimination of ocean outfalls as a primary means of domestic wastewater discharge are in the public interest." In response to requirements associated with this statute, the Miami-Dade Water and Sewer Department (MDWASD) is transitioning the treated wastewater disposal protocol at the North District Wastewater Treatment Plant (NDWWTP) from the existing ocean outfall to the following two disposal means: (1) beneficial reuse—such as landscape irrigation—to meet public and natural systems demands, and (2) injection into the Boulder Zone, a porous geologic region approximately 900 meters below ground. The NDWWTP is located in Miami-Dade County, near the City of North Miami Beach.

The Florida Department of Environmental Protection (FDEP) issues administrative permits to the MDWASD to operate the NDWWTP. In August 2008, the FDEP required that MDWASD conduct a study of the injection of treated wastewater into the Boulder Zone, and drill a monitoring well into the Floridan Aquifer. The monitoring well has an anticipated total cost in excess of $2M. The U.S. Geological Survey (USGS)—a bureau within the U.S. Department of the Interior—is currently assisting the MDWASD with the study. The USGS has preliminarily determined that a significant data deficiency exists, and that the quality of the study may improve, with additional characterization of hydrogeologic properties of the Boulder Zone, Avon Park Permeable Zone, and Upper Floridan Aquifer. The Avon Park Permeable Zone and Upper Floridan Aquifer—located at shallower depths than the Boulder Zone—are porous geologic regions and potential underground sources of drinking water (USDW). The FDEP agreed to modify the August 2008 permit to indefinitely delay the $2M Floridan Aquifer monitoring well if MDWASD collects data and conducts analyses to refine existing knowledge related to the Boulder Zone, Avon Park Permeable Zone, and Upper Floridan Aquifer.

Structural features that have potential to increase the vertical hydraulic conductivity of the rocks of the Floridan aquifer system have been recently defined in Biscayne Bay (Cunningham and Walker, 2009). It is possible that structural features such as fracturing, faulting, and/or solution collapse may be present in the proximity of the NDWWTP. If present these features could possibly negatively impact confinement between aquifer zones within the Floridan aquifer and allow the potential for vertical migration of wastewater injectate upward, from the Boulder Zone and into USDWs.

Objective

Objectives of the proposed work are to (1) define the subsurface structure in the Floridan aquifer system, in the proximity of the NDWWTP; and (2) characterize transmissivity in the Boulder Zone, Avon Park Permeable Zone, and Upper Floridan Aquifer, at the NDWWTP.

Technical Approach

The technical approach is divided into two elements: hydraulic tomography and reflection seismic survey.

Hydraulic Tomography: The USGS will characterize the Boulder Zone by perturbing the hydrogeologic system with a range of injection rates. The USGS will record injection flow rates to injection wells; pressures in injection wells; salinity, ammonia concentration, and temperature of injected effluent; and pressures in monitoring wells.

The USGS will characterize the Avon Park Permeable Zone and Upper Floridan Aquifer by purging monitoring wells, which will cause a release of artesian pressure. The USGS will collect salinity, ammonia concentration, and temperature of purge water; and pressures in both monitoring and injection wells.

Preliminary modeling of the proposed tests suggest a wide range of potential responses, depending on hydrogeologic parameters. For example, hypothetical injection of a total of 168 million gallons of treated wastewater over seven days, into Injection Wells 2 and 3, yields expected head increases at Injection Wells 1 and 4 that range from 6 centimeters to 7 meters. Hypothetical purging of 1,000 gallons in one day at Upper Floridan Aquifer Monitoring Well FA-1N yields expected head decreases at the other three monitoring wells, which range from being undetectable to a 3 meter decrease in head, as shown in Figure 1. This range of expected head changes is based on the well-known Theis Equation

$$h(t) - h(t + \Delta t) = \frac{Q}{4\pi T} \int_{r^2 S / 4T\Delta t}^{\infty} \left(\frac{e^{-z}}{z} \right) dz$$

where *h(t)* is head at some time *t*, *h(t+Δt)* head at some time *t+Δt*, *Q* steady-state pumping rate, *T* transmissivity, ∞ infinite radial distance from the well, *r* finite radial distance from the well, *S* storativity, *z* integration variable, and *e* is the exponential function.

Both hypothetical ranges of expected head change occur over assumed ranges of hydraulic conductivity, which bracket anticipated hydraulic conductivity, and span four orders of magnitude.

The USGS will use a technique called hydraulic tomography to characterize hydrogeologic properties in the Boulder Zone, Avon Park Permeable Zone, and Upper Floridan Aquifer. The USGS will use collected data, and the well-known numerical models PEST and SEAWAT.

Reflection Seismic Survey: Acquisition, processing, and interpretation of water-based reflection seismic profiles will test the presence of fractures, faults, and/or solution collapse structures in the Floridan aquifer. This seismic task will be accomplished by: (1) acquisition of high-resolution water-based reflection seismic data near both the NDWWTP and the South District Wastewater Treatment Plant (SDWWTP), in Miami-Dade County (Figures 2), (2) processing data, and (3) conducting one check-shot survey at each plant. Data from the SDWWTP will be used to create a comparative analog for the structural character of the rocks of the Floridan aquifer system at the NDWTTP. The acquisition of seismic profiles will mainly extend through canals near the two plants.

The land- and water-based profiles will be focused on a lithostratigraphic section that includes the Floridan aquifer system. Nearby wastewater injection wells will provide sufficient data to make a reasonable correlation between a hydrostratigraphy and lithostratigraphy in the wells, and seismic stratigraphy on the profiles. Correlation between well data and seismic-profile data will be verified with one check-shot survey acquired at each plant—for a total of two check shot surveys. Check shot surveys can produce a unique relationship between sonic travel time and depth below ground surface. Seismic synthetic logs can be produced from some sonic logs, which are available for wastewater injection wells, to assist in correlation of well data to seismic reflection profiles. The following specific tasks are associated with seismic methods used in this project:

- **Seismic acquisition:** Acquisition includes mobilization of a boat, seismic field equipment, and use of a crane to lift a boat carrying seismic equipment in and out of canals. Data will be

collected in two canals at the NDWWTP (Figure 2), and in four canals and along one east-west transect on land at the SDWWTP (Figure 3).

- **Data processing:** The basic processing steps will include trace editing, multiple and noise attenuation, near surface muting and dip filtering to remove direct and refracted arrivals, velocity analysis, and the application of several processes—including bandpass filtering, spectral balancing, and spectral whitening—before stacking and migrating the data. A number of post-stack processes to enhance the data may also be applied, as needed.
- **Display:** After data processing, common mid-point (CMP) stacked and migrated seismic sections will be displayed on paper records and electronic files, and the SEGY formatted digital sections will be delivered on external hard drives (HDD).
- **Check-shot Survey Acquisition, Processing, and Display:** Acquisition includes (1) drilling a shallow borehole (about 10 ft deep) near a wastewater treatment well, (2) placement of a small sonic source (compressed air) within the borehole, and (3) detection of numerous releases of the sonic source by a wireline sonde, as the sonde is lowered into the wastewater treatment well, from near the surface to the bottom of the well.
- **Seismic interpretations:** Combined use of SMT Kingdom Suite software, paper prints of processed seismic profiles, and well data from injection well fields, will be utilized in characterization of structures in the rocks of the Floridan aquifer system.

Deliverable

The USGS will publish hydraulic tomography data and interpretations in a peer-reviewed, USGS Scientific Investigations Report. The USGS will publish seismic survey interpretations in a peer-reviewed journal article.

Timeline

The project will begin in Fiscal Year 2009. Major milestones are detailed in Table 1.

Table 1. Project milestones.

Milestone	Start Date	End Date
Seismic Acquisition & Processing	June 2009	September 2009
Hydraulic Tomography Field Tests	October 2009	February 2010
Data interpretation	November 2009	December 2010
Published report	September 2010	September 2011*

*Journal article will be submitted for journal review by Sept. 2011

Funding

Worksheet 1 summarizes the USGS fee to perform work described in this proposal.

Worksheet 1. USGS fee.

FY 2009	$40,000
FY 2010	$263,450
FY 2011	$134,438
TOTAL	**$437,888**

Worksheet 2. Walker Marine Geophysical Co. sole-source fee.

FY 2009	$104,750
TOTAL	**$104,750**

For the hydraulic tomography investigation, MDWASD will bear all costs to purchase or rent monitoring instruments; install monitoring instruments; and purchase calibration standards, which are required to calibrate monitoring instruments. MDWASD will make monitoring instruments and calibration standards available to the USGS for use on the hydraulic tomography investigation, and procure or conduct an elevation survey of connection ports used to mount pressure instruments to NDWWTP components. The cost to MDWASD—associated with actions described in this paragraph—is not included in the USGS fee detailed in Worksheet 1; this cost represents an additional project cost to MDWASD, over-and-above the USGS fee detailed in Worksheet 1. The USGS will return all MDWASD instruments and unused calibration standards to MDWASD, at the conclusion of data collection activities.

No permitting of seismic acquisition will be necessary on Miami-Dade County waterways and surface property. The Walker Marine Geophysical fee detailed in Worksheet 2 is presented for information purposes only; a sole-source contract for these services must be procured by MDWASD.

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