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

Memorandum

MIAMI-DADE COUNTY

Date: December 4, 2007

To: Honorable Chairman Bruno A. Barreiro and Members, Board of County Commissioners

From: George M. Burgess
County Manager

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

R-1321-07

Subject: Assessment of seawater encroachment and seawater encroachment monitoring network improvements in Miami-Dade County, Florida

RECOMMENDATION

It is recommended that the Board of County Commissioners (Board) adopt the attached resolution approving a Joint Funding Agreement between the Miami-Dade County and the U.S. Geological Survey (USGS) to conduct an "Assessment of Seawater Intrusion and Seawater Encroachment Monitoring Network Improvements in Miami-Dade County." The South Florida Water Management District (District) is requiring the County to update the location of the seawater-freshwater interface as part of the 20-Year Consumptive Use Permit (CUP) which was done in a similar study by the USGS in 1995.

SCOPE OF AGENDA ITEM

The impact of this agenda item is countywide as it is a required component of the 20-Year CUP being obtained from the District.

FISCAL IMPACT/FUNDING SOURCE

The fiscal impact of this agenda item is $1,825,764 which is the portion of this Joint Funding Agreement that will be funded by the Miami-Dade Water and Sewer Department (MDWASD). The funding source is renewal and replacement funds and water connection charges.

TRACK RECORD/MONITOR

The USGS is a federal agency that is regarded as the national expert in the field of sea-water encroachment and groundwater studies. MDWASD's Water Resources Section will monitor this agreement.

BACKGROUND

Based on the Miami-Dade County Interim Consumptive Use Authorization and Agreement (Agreement) executed between the District and Miami-Dade County on May 10, 2006, MDWASD is required to provide data which monitors the landward movement of the seawater-freshwater interface in the Biscayne Aquifer. The seawater-freshwater interface is a thin transition zone that separates saltwater from fresh water. The District requires saltwater levels to be continuously monitored to make certain saltwater intrusion does not occur as a result of the County's wellfield operations, which pump raw water countywide from the Biscayne Aquifer.

MDWASD submitted to the District a plan including a network of existing monitoring wells as well as a plan to install new monitoring wells to assess the location of the seawater-freshwater interface. In addition, MDWASD proposed to contract USGS to delineate the seawater-freshwater interface. The last delineation of this interface was conducted in 1995. Since that time, many hydrologic changes may have impacted the location of the seawater-freshwater interface. On August 10, 2007, the District approved MDWASD's Plan.

The main objective of this USGS study is to identify the present location of the seawater-freshwater interface by using the County's existing monitoring wells and newly installed monitoring wells and by conducting other types of geophysical studies that will examine the unique characteristics that make-up the Biscayne Aquifer. In addition, the USGS study will provide real time access to the seawater-freshwater interface via the USGS website.

Data gathered and analyzed as part of this USGS study will be submitted on an annual basis to the District as part of the yearly submittal requirements of the 20-Year CUP. The first phase of this project is due to the District one year after the 20-Year CUP is issued to the County by the District on November 15, 2007.

Assistant County Manager

MEMORANDUM

(Revised)

TO: Honorable Chairman Bruno A. Barreiro and Members, Board of County Commissioners

DATE: December 4, 2007

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 Manager'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

Approved _____ Mayor

Veto _____

Override _____

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

12-04-07

RESOLUTION NO. **R-1321-07**

RESOLUTION APPROVING A JOINT FUNDING AGREEMENT BETWEEN MIAMI-DADE COUNTY AND U.S. GEOLOGICAL SURVEY TO CONDUCT AN ASSESSMENT OF SEAWATER ENCROACHMENT AND SEAWATER ENCROACHMENT MONITORING NETWORK IMPROVEMENTS IN MIAMI-DADE COUNTY, FLORIDA IN THE AMOUNT OF $1,825,764

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 the amount of $1,825,764, in substantially the form attached hereto and made a part hereof; and to exercise the provisions contained therein.

The foregoing resolution was offered by Commissioner **Jose "Pepe" Diaz** who moved its adoption. The motion was seconded by Commissioner **Joe A. Martinez** and upon being put to a vote, the vote was as follows:

Bruno A. Barreiro, Chairman **aye**
Barbara J. Jordan, Vice-Chairwoman **aye**

Jose "Pepe" Diaz	**aye**	Audrey M. Edmonson	**aye**
Carlos A. Gimenez	**aye**	Sally A. Heyman	**absent**
Joe A. Martinez	**aye**	Dennis C. Moss	**aye**
Dorrin D. Rolle	**aye**	Natacha Seijas	**aye**
Katy Sorenson	**absent**	Rebeca Sosa	**aye**
Sen. Javier D. Souto	**absent**		

The Chairperson thereupon declared the resolution duly passed and adopted this 4th day of December, 2007. 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

PROJECT PROPOSAL

ASSESSMENT OF SEA-WATER ENCROACHMENT AND SEA-WATER ENCROACHMENT MONITORING NETWORK IMPROVMENTS MIAMI-DADE COUNTY, FLORIDA

PROBLEM

Sea-water encroachment represents a major threat to the freshwater resources of coastal areas in Miami-Dade County. Along the eastern and southern coast, there are locations where sea-water from the ocean is continuing to move inland into the karst Biscayne aquifer. Water managers concerned with Miami-Dade County water supply need more information describing the inland extent and movement of saltwater in the aquifer to help in determining which methods work best at retarding and reversing saltwater intrusion as well as the potential impacts of these methods on the ecosystem. A long-term measured and projected increase in sea level further exacerbates management of salt-water intrusion.

However, delineation of the sea water-freshwater boundary has not been updated in about twelve years. Water managers concerned with Miami-Dade County water supply need up-to-date information on the location of the inland extent and movement of saltwater in the Biscayne aquifer to make water-management decisions.

There are several complexities that hinder full and accurate delineation of location, and characterization of the movement, of the sea-water front. These included:

- Inadequate understanding of the hydrostratigraphic system

  Recent investigations conducted by the USGS, show that the karst Biscayne aquifer can be most accurately conceptualized as a dual porosity aquifer (Cunningham and others, 2006). The effect of highly permeable flow zones on the geometry of the interface is poorly understood. Many of the well previously installed for the sea-water encroachment monitoring network did not have the detailed evaluations of hydrostratigraphy needed to characterize the movement of the sea-water front. New borehole geophysical and advanced stratigraphic methods have been shown to be useful elsewhere in the County by USGS but have not been implemented near the sea-water front.

- Lack of truly spatial coverage

  Cost always limits the number of monitoring wells that can be installed to delineate the location of the sea-water front. Time-domain electromagnetic soundings coupled with electromagnetic logs of monitoring wells have provided a greatly enhanced spatial understanding of the location of the sea-water front in the everglades along the Florida Bay. These same time-domain electromagnetic soundings have been conducted south of Homestead and as far east as Turkey Point. But these data were not processed because this effort was not supported.

- Need for new and replacement monitoring wells

In some locations there are no monitoring wells available to evaluate changes in position of the sea-water front. An added problem is that some of the existing monitoring wells are no longer as useful for monitoring sea-water encroachment as they had once been. This is because changes in the position of the sea-water front have rendered some of the existing monitoring less useful. Also, in some locations the wells are not optimally constructed for the monitoring that is needed. New saltwater-intrusion monitoring wells are locally needed to evaluate the potential effect of increased water-supply needs, changes in land use, and proposed coastal rock mines.

- Need for improved access to available information

  Decision managers frequently have difficultly compiling all the information available for their ongoing evaluations. Although the USGS will compile all the available information and evaluate it geographically for the proposed study, these major re-evaluations of the location of the salt front and redesign of the network are only done on an infrequent basis. In between these major reevaluations decision makers will routinely need to compare the most recent data collected to last salt front line drawn by the USGS to see where changes are occurring and to decide when another major re-evaluation of the network and position of the salt front are needed.

BACKGROUND

Construction of uncontrolled drainage canals in the 1920's and 1930's resulted in the lowering of water levels in the Biscayne aquifer and induced the inland movement of seawater into the aquifer adjacent to the coast of Miami-Dade County. Sea-water also moved directly up the canals in some locations and added to the overall contamination of the aquifer. This was also accompanied by the oxidation and compaction of peat soils that had functioned as a sponge to help maintain higher ground-water levels in the underlying Biscayne aquifer.

In 1946, sheet-steel piling, salinity-control structures were installed in all primary canals as far seaward as possible. These controls prevented inland saltwater flow driven by tidal changes from moving upstream in the canals beyond the controls and maintained higher water levels in the aquifer near the coastline than had occurred during the period of uncontrolled drainage. In some areas particularly around the Miami-Canal this has resulted in a reduction of chloride content in sampled monitoring wells.

In the early 1960's, the existing canal system in south Miami-Dade County was expanded to provide for flood control. The canals were equipped with flow-regulation structures both near the coast and inland, allowing water levels to be stepped down from structure to structure to prevent excessive drainage. However, the design and operation of this system lowered freshwater levels in the aquifer, especially near the coast, allowing for the inland movement of saltwater during the drought years of 1970 and 1971.

Beginning in 1976, additional water was routed to south Miami-Dade County, raising water levels along the coast, slowing or even reversing the inland movement of the saltwater front. Since 1984, additional events have occurred which have affected water levels in the Biscayne aquifer and, hence, the movement of the saltwater front. Among these are the beginning of operation of the Northwest well field and a consequent reduction in pumping from the Hialeah-Miami Springs well field , expansion of the Southwest

well field and changes in the delivery schedule of water to south Miami-Dade County and the Everglades National Park.

Coastal discharge appears to have declined during the last 50 or more years, due in part to water being rerouted to secondary canals, and to induce recharge to the Biscayne aquifer near large municipal well fields that withdraw water at a rate of 394 MGD. Current withdrawal rates represent a 6-fold increase since the 1930s when salt-water intrusion was first recognized as a critical Miami-Dade County water-resource issue (Renken and others, 2005).

Various methods to slow or reverse this migration by increasing water levels in the Biscayne aquifer have been implemented or are being considered. These methods include the development of regional well fields farther inland, supplementing the water supply with water obtained from lower confined aquifers of poorer water quality, increasing delivery of water to coastal canals, and construction of additional surface water control structures.

Despite all measures taken to date, including some successful efforts to push the sea water front back in some locations, occasional influxes of saline water have still been observed in some canals and the front is still moving landward in some locations. This is indicated by increased chloride concentrations in water samples obtained from monitor wells such as F-279 and G-3601 near the Biscayne Canal in northeastern Maimi-Dade County (figs. 1 and 2). Because of this movement there has, in recent years, been insufficient data to determine the exact location of the saltwater front in some areas, and in others the front has moved inland past the existing monitor wells. The current monitoring network needs to be improved to monitor the position of the sea-water front.

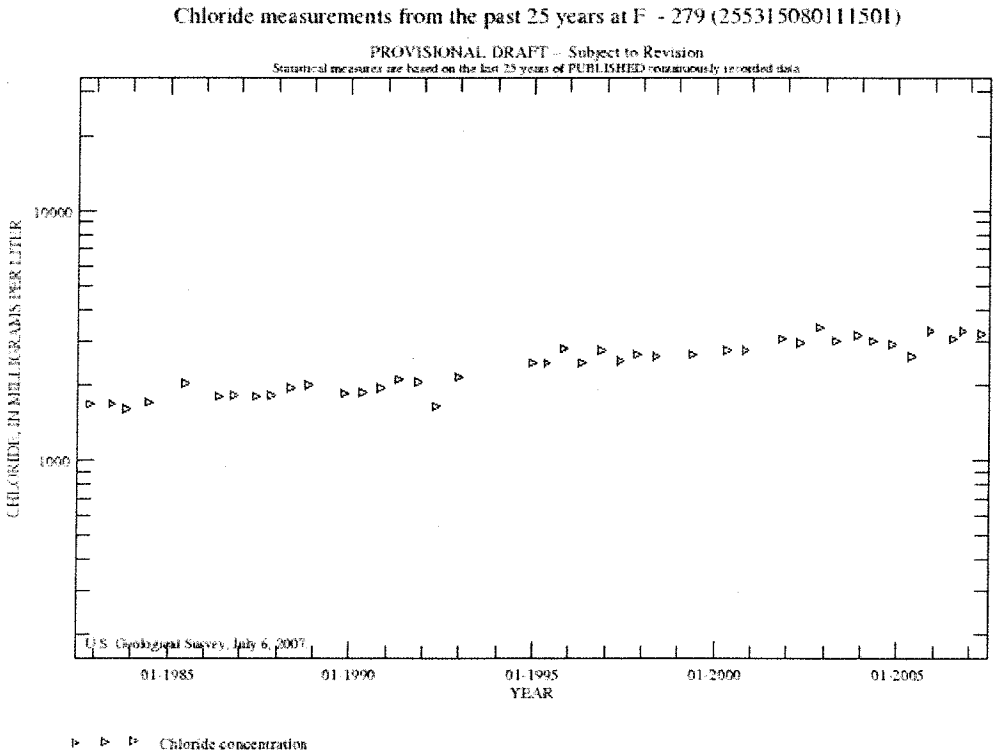

Figure 1. Increasing chloride content in well F-279 near the Bicayne Canal, northeastern Miami-Dade County

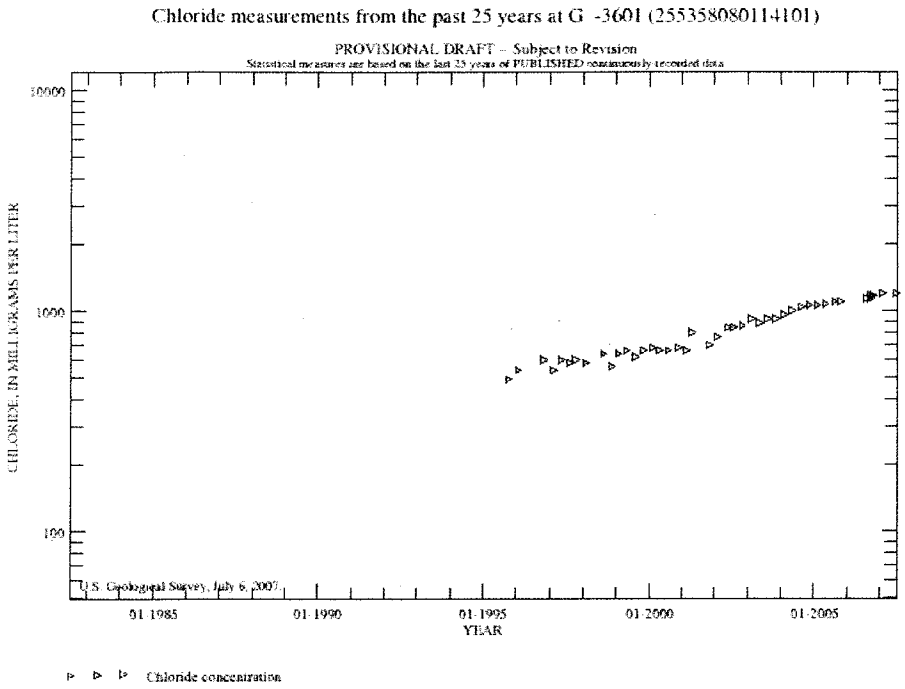

Figure 2. Increasing chloride content in well G-3601 near the Bicayne Canal, northeastern Miami-Dade County

The problem of saltwater intrusion in Miami-Dade County has been investigated by the U.S. Geological Survey (USGS) beginning in 1939 through the collection and evaluation of water level and salinity data. The history of saltwater intrusion in central Miami-Dade County was well documented by Parker and others (1955) for the period 1904 to 1950, by Leach, Klein, and Hampton (1972) through 1969, Klein and Waller (1985) through 1984, Sonenshien (1997) through 1995, Prinos and others (2002) and Renken and others, (2005) through 2000.

Monitoring landward movement of the saltwater-freshwater interface is critical to managing fresh ground-water withdrawals from municipal well fields, surface-water levels in canals, and construction of urban projects that effect ground-water levels. Problematic to managing the fresh ground-water supply in coastal areas is that some existing monitoring wells are in poor condition, and others are no longer strategically located. New saltwater-intrusion monitoring wells are needed locally to evaluate the effects of increased ground-water withdrawals, the land-use and land-cover transformations that are occurring through successive conversion of one land class to another (e.g., agricultural to urban), and the proposed construction of coastal rock mines. Also, the location of saltwater-freshwater boundary is uncertain, as the line showing the landward extent of saline water has not been updated in twelve years. Water managers concerned with Miami-Dade County water supply need current information on the location of the inland extent and movement of saltwater in the Biscayne aquifer to make informed water-management decisions.

Further complicating delineation of the saltwater-freshwater interface is its integration with a revised conceptual understanding of the physical system. Recent investigations conducted in Miami-Dade County by the USGS, shows that the karst Biscayne aquifer is more accurately depicted as a dual porosity aquifer. The effect of highly permeable flow zones on the character and movement of the interface within these flow zones is poorly understood. Accurate delineation of this interface may be possible through integration of time-domain electromagnetic soundings, and new borehole geophysical and advanced stratigraphic methods shown to be useful elsewhere in the County by USGS.

OBJECTIVES

The main objectives of this proposal are to: (1) delineate the present location of the sea-water front using the existing sea-water encroachment monitoring network, additional existing or new monitoring sites, time-domain electromagnetic soundings, (2) create a better framework for understanding the changes in salinity that are occurring by improving the hydrostratigraphic characterization of this area using borehole geophysical methods and lithologic evaluations, and (3) improve accessibility to sea-water encroachment information through enhancements to the USGS cooperative water conditions website. (4) publish an up-to-date map showing the landward limit of the saltwater in Miami-Dade County Salinity.

SCOPE

The study area will be limited to the eastern and southern coastal portions of Miami-Dade County, from the Broward County line to Florida Bay. An initial estimate of the landward limit of sea water in the Biscayne aquifer of Miami-Dade County Salinity will be determined where sufficient data exist. The final assessment of the landward limit of sea water in Miami-Dade will be completed after additional geophysical, isotopic, and lithologic evaluations are completed and data from newly installed monitoring wells are evaluated. This project does not include the cost for monitoring well drilling and installations these will need to be contracted separately. A website will be created to allow better access to the available information concerning sea-water encroachment.

APPROACH

The main tasks important to success of this proposal are: (1) analysis of existing sea water encroachment data to provide an initial estimate of the location of the sea-water front; (2) acquire surface and/or aerial resistivity data to assist in locating new monitoring wells improve the spatial delineation of the sea-water front; (3) site and construct new monitoring wells where needed (4) provide on-site geologic expertise while monitoring wells are drilled, geophysically logged, and constructed; (5) assimilate the new detailed hydrogeologic information to identify potential preferential flow zones, and assess the porosity and lithology of the aquifer to better quantify the role of variables influencing bulk conductivity (lithology, porosity, and ground-water conductivity), a critical measurement in a sound saltwater-freshwater interface monitoring program; (6) use isotopic sampling to determine if saline water is connate or encroaching from the sea; (7) integrate the new data with existing monitoring well data to revise the position of the saltwater-freshwater interface; (8) Modify the existing ground-water conditions websites to an IMS type of website that will include coverages of all available salinity monitoring sites, the last mapped location of the salt front, and automatic statistical and graphical evaluation of changes in salinity.

Work on the major proposal tasks will begin in FY 2008 and end in FY 2011. Because the evaluation of the existing monitor network and the selection of sites for new monitor wells require that the approximate location of the saltwater front is known, a preliminary map of the saltwater front will be prepared early in the study and a GIS coverage of this provided to the cooperator. This map will be updated as additional data is collected.

The data to be used is primarily the data which has and will be collected by the USGS, but there is some data available from other organizations. This will be acquired and evaluated and used were applicable.

Surface and aerial geophysical techniques will be applied as needed to help site new monitoring wells and improve our spatial understand of the location of the sea-water front An inventory of existing electromagnetic data from the area will be made. This is known to include helicopter electromagnetic (HEM) data collected in Everglades National Park (ENP) (Fitterman and Deszcz-Pan, 1998, 1999, 2001, 2002, 2004) and the area east and south of Homestead, FL. This triangular region bounded on the west by U.S. 1, on the north by an east-west line through the Turkey Point nuclear power plant, and the coast on the eastern and southern edges was flown in October 2001, but never interpreted. The data require processing for evaluation purposes before interpretation can begin. Preliminary products should be of help in initial mapping of the saltwater front in this area. There are also some time-domain electromagnetic (TEM) soundings that have been made in ENP and Miami-Dade County that will be of interest to this project. These data will be identified and evaluated for their suitability for use in the data interpretation. Additionally there are induction logs in monitoring wells that have been occasionally logged. These logs are important to this work as they can be used to evaluate subsurface conditions that might have changed over time, and they provide a way of connecting the 2001 HEM survey results with the historical and future measurements. Following completion of the data inventory, various map products will be prepared from the HEM data that can be used in the initial saltwater front mapping.

Based on the initial analysis using the available HEM data, sites will be selected for additional ground-based electromagnetic measurements. These will most likely be TEM soundings, though we will not rule out the use of other techniques such as DC resistivity and trailer mounted electromagnetic profiling. The DC resistivity has the advantage of being less susceptible to electromagnetic interference and the influence of buried, man-made conductors such as pipes, than TEM soundings. These newly acquired data will be used to quantitatively interpret the HEM data set and develop models that are consistent with well data analysis and hydrologic modeling results.

USGS hydrogeologists who will oversee the drilling and construction of a number of monitoring wells, describe the core lithology and unconsolidated sediments, and archive the cores and sediment samples for the duration of the project. USGS staff will acquire borehole geophysical data that includes: natural gamma ray, fluid conductivity and temperature, EM-induction, 3-arm caliper, full wave-form sonic, borehole flowmeter, and OBI-40 Mark IV digital optical borehole images. The following activities are included to complete of the fifth task of data interpretation. USGS staff will interpret the surface geophysical soundings and conductivity logs used to optimize the depth placement of monitoring wells. Cores and unconsolidated sediment samples will be described in the context of defining an accurate cyclostratigraphy and aquifer hydrostratigraphy. Identification of molluscan and benthic foraminiferal taxonomy, and thin-section petrography will be included in the core analysis to best define and provide a cyclostratigraphy that allows correlation of preferential flow zones. Information will be provided on porosity, lithologies, and conductivity for future calculation of chloride concentrations.

All of the newly collected data will be integrated with salinity data from existing monitoring wells to produce a new map of the saltwater-freshwater boundary. All final interpretations will be provided to Miami-Dade County in a final USGS report that includes a cross section displaying a detailed cyclostratigraphic and hydrostratigraphic framework of a number of new monitoring wells.

A website that provides access to all of the salinity information collected as part of this project and as part of the ongoing network will be created by modifying the existing USGS cooperative current ground-water conditions website in to an IMS format that will allow integration of this information with the GIS projects of researchers, and the ability to provide detailed GIS coverage that can not be displayed on the existing website. This will allow managers to use all of the salinity information collected as part of this project and actively being collected and provided by the USGS and others, to evaluate changes that will occur even after this project has been completed.

COOPERATOR ASSISTANCE

All well drilling and installation will be contracted by the Miami-Dade Water and Sewer Department (WASD) according to USGS drilling standards and specifications. This will include providing the materials to be used, such as well screen and casing. The USGS will work closely with these WASA and the contracted drillers to do all it can to insure that sites will be drilled and constructed in the manner necessary for sound data collection.

BENEFITS

Although saltwater intrusion along the east coast of Miami-Dade County has been studied for nearly 70 years, there are still many gaps in our knowledge of the problem. The results of this study will provide information, including the location of the sea-water front throughout the entire study area and an improved understanding of the hydrogeologic framework of the county. This information will be useful in the management of water withdrawals from the Biscayne aquifer. Data from this study will be useful to researchers using mathematical models to investigate groundwater flow in the Biscayne aquifer and the movement of the saltwater interface in the aquifer. Additionally, the results of the study will provide information on how aerial and surface geophysics, and downhole electromagnetic induction logs can be used to determine the location and rate of movement of the saltwater front. These techniques can be applied in other coastal areas where saltwater intrusion may be a problem. Finally, the study will be used to provide a more cost effective monitoring network by removing those wells that are no longer effective in meeting the goals of the network.

REPORTS

Progress reports will be provided to WASD and DERM on a semi-annual basis. These progress reports will include alternatives to the current monitoring program; include the sites selected for additional monitor wells as determined. The initial estimated location of the landward extent of sea water in the Biscayne aquifer in Miami-Dade County will be provided in the first year. A final report will be prepared which will include: (1) a map showing the current position of the saltwater front, (2) data and interpretations from geophysical and lithologic logging, and (3) data from sampling performed at existing and newly drilled wells.

WORK PLAN

Task	Begin Date	Completion Date
Acquisition of available salinity and geologic data and creation of a GIS line depicting the estimated landward extent of sea-water in the Biscayne aquifer	November, 2007	October, 2008
Modification of current conditions website to provided enhanced access to salinity information in an IMS format.	November, 2007	March, 2009
TDEM and other EM surveys, and interpretation of results.	October, 2007	September 2010
Drill coreholes, log, and construct new monitoring wells.	October, 2008	September 2010
Collection of isotopic and major ion data.	October, 2008	September 2010
Data Interpretation	October, 2008	September 2010
Creation of GIS depicting the landward extent of sea-water based on new data	September, 2010	March, 2011
Preparation and publication of final report	April, 2010	September, 2011
Addition of final GIS information to IMS webiste	September 2011	October, 2011

ESTIMATED FUNDING

Cost per fiscal year (Begins October 1 and ends September 30)

Cooperator	FY2008	FY2009	FY2010	FY2011	Total
USGS Required Funding for project	$397,325	$552,805	$569,834	$305,800	**$1,825,764**
Estimated cost of drilling drilling contract (4 monitor wells/yr)*	-	$128,000	$135,000	-	**$263,000**
Total	**$397,325**	**$680,805**	**$704,834**	**$305,800**	**$2,088,764**

*Drilling contracted through Miami-Dade County

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ORIGINAL

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Form 9-1366
(Oct. 2005)

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

Customer #:	FL016
Agreement #:	08E0FL208004
Project #:	8-2080-
TIN #:	59-6000573
Fixed Cost Agreement	☑ Yes ☐ No

FOR
WATER RESOURCES INVESTIGATION

THIS AGREEMENT is entered into as of the 1st day of October, 2007, 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 ASSESSMENT OF SALTWATER INTRUSION AND SEA-WATER ENCROACHMENT MONITORING NETWORK IMPROVEMENTS MIAMI-DADE COUNTY, FLORIDA, 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	October 01, 2007	**to**	September 30, 2011
		by the party of the second part during the period		
(b)	$1,825,764.00	October 01, 2007	**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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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

USGS Point of Contact

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Ft. Lauderdale, FL 33315
DUNS #: 137784026
Telephone: 954.377.5932
Email: jhappel@usgs.gov

Signatures

By [signature] Date 9/23/07
Name: for Dr. Barry Rosen
Title: FISC Director

By_____ Date_____
Name:
Title:

By_____ Date_____
Name:
Title:

MIAMI-DADE COUNTY

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_____
Name:
Title: County Manager

By_____ Date_____
Name:
Title:

By_____ Date_____
Name:
Title:

Approved by County Attorney as to form and legal sufficiency: [signature]