

Sarasota County Solid Waste Operations

Central County Solid Waste Disposal Complex Water Quality Monitoring Plan December 9, 2013

WATER QUALITY MONITORING PLAN

CENTRAL COUNTY SOLID WASTE DISPOSAL COMPLEX SARASOTA COUNTY, FLORIDA WACS ID No: SWD/58/51614

December 9, 2013

Prepared From:

Document entitled "Ground Water Monitoring Plan Addendum," prepared by SCS Engineers, dated June 28, 2002, with revisions dated July 24, 2002 [Section 2 – Leachate Sampling Parameters] and September 16, 2002 [Appendix A], received June 28, 2002, July 29, 2002, and September 20, 2002

SCS Engineers, 3012 U.S. Highway 301 North, Suite 700, Tampa, Florida 33619

"Revisions to Section 4.0 of the SCS document" – dated February 22, 2007 PBS&J, 428 South Keller Road, Orlando, Florida 32810-6101

"Water Quality Monitoring Plan Addendum" – April 23, 2009 HDR, 5426 Bay Center Drive, Suite 400, Tampa, Florida 33609-3444

"Water Quality Monitoring Plan Addendum" – dated July 2010 HDR, 5426 Bay Center Drive, Suite 400, Tampa, Florida 33609-3444

"Geotechnical Services: Soil and Groundwater Sampling Analysis, Sarasota County Central Landfill, Sarasota County, FL" dated July 12, 2010, Dunkelberger Engineering and Testing, Inc., 8260 Vico Court, Unit B, Sarasota, Florida 34240

"Natural Attenuation With Monitoring Plan" - dated August 2010, Innovative Waste Consulting Services, LLC (IWCS) and PBS&J, 6628 NW 9th Boulevard, Suite 3, Gainesville, FL 32605

"Background Groundwater Quality Assessment" - dated October 4, 2011, IWCS and Atkins, 6628 NW 9th Boulevard, Suite 3, Gainesville, FL 32605

This Water Quality Monitoring Plan was developed from information contained within the documents listed above at the request of the Florida Department of Environmental Protection (FDEP). During a meeting held on July 17, 2013, FDEP personnel requested that the Water Quality Monitoring Plan be updated and included with the facility's permit renewal application. Each of the documents were signed and sealed by a registered professional geologist or professional engineer prior to submittal to the Florida Department of Environmental Protection. During the meeting, it was noted that sampling and analysis of landfill leachate and gas condensate would no longer be required at this facility, so sampling of these liquids is not part of this Water Quality Monitoring Plan.

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SECTION 1.0

INTRODUCTION

The Florida Department of Environmental Protection (FDEP), Permit Number S058-299180 to operate the Central County Solid Waste Disposal Complex was issued to the Sarasota County Solid Waste Operations on July 30, 1997. Operation of the landfill began on June 15, 1998. Since this date, the original permit expired and the landfill has been further developed to include an additional Phase, know as Phase II. The current permit for the operation of the landfill is Permit Number 130542-0007-SO/01. It was issued on November 18, 2008 and expires on November 18, 2013. This document is being provided as a submittal to be included with the permit application to renew the permit.

As specified by 62-701.510(2), F.A.C., the permittee shall provide FDEP with a Water Quality Monitoring Plan (WQMP) for the landfill site that describes the ground water and surface water monitoring systems. This document satisfies this requirement.

SECTION 2.0

GROUNDWATER

2.1 MONITORING AND PIEZOMETER WELLS

The standard Solid Waste Facility groundwater monitoring program consists of collecting groundwater samples from the locations listed in Table 2-1. A separate, but related, Natural Attenuation Monitoring groundwater program is discussed below in Sections 2.4 and 2.5 that will fulfill the requirements of Consent Order 08-1728.

The standard monitoring program includes sampling one background well and nine detection wells. All of the monitoring wells are installed in the surficial aquifer. There are no intermediate aquifer (permeable beds of the Hawthorn Group) or Floridan aquifer monitoring wells used as part of the groundwater monitoring program.

Monitoring wells MW-3 and MW-5 are inactive, but are used for water level measurements. These wells are included in the groundwater monitoring program for water level data collection only. Compliance wells CW-8A, CW-9, CW-10R, CW-15, and CW-16 will be converted to piezometers, and will be used only for water level measurements.

Due to poor siting and access issues, MW-18, MW-19, and MW-20 will be abandoned. MW-18 will be replaced with a new well, MW-18R. CW-19 and CW-20 will be re-named as MW-19A and MW-20A, respectively, and will be used as detection wells. Replacement monitoring well MW-18R will be installed as discussed in Section 2.2. Monitoring wells MW-18, MW-19, and MW-20 will be abandoned as discussed in Section 2.2.

Figure 1 shows the monitoring well locations.

TABLE 2-1. GROUNDWATER MONITORING WELLS AT CCSWDC

Well Number	WACS ID#	Aquifer Monitored	Purpose	Comments
MW-1R	20585	Surficial	Background	MW-1 replaced due to groundwater level not in screen
MW-3	4503	Surficial	Piezometer	Used for water level elevation only
MW-5	4505	Surficial	Piezometer	Used for water level elevation only
MW-8A	21453	Surficial	Detection	MW-8 replaced due to groundwater level not in screen

Well Number	WACS ID#	Aquifer Monitored	Purpose	Comments
MW-9	4509	Surficial	Detection	Phase I
MW-10R	4510	Surficial	Detection	MW-10R was a replacement well for MW-10 - May 1996
MW-15	23031	Surficial	Detection	Phase II
MW-16	23032	Surficial	Detection	Phase II
MW-17	23033	Surficial	Detection	Phase II
MW-18R	TBD	Surficial	Detection	Phase II – replacement for MW-18
MW-19A	27140	Surficial	Detection	Phase II – replacement for MW-19 (formerly CW-19)
MW-20A	27141	Surficial	Detection	Phase II – replacement for MW-20 (formerly CW-20)

TBD = to be determined

2.2 MONITORING WELL INSTALLATION, DESIGN AND ABANDONMENT

Monitoring wells shall be constructed as shown on Figure 2, Typical Groundwater Monitoring Well. Record drawings for all newly installed groundwater monitoring wells shall be submitted to the FDEP on Form 62-701.900(30), Monitoring Well Completion Report, Attachment A.

An initial sampling event shall be conducted within seven (7) days of well installation and development, for the analysis of the field and laboratory parameters currently required by the facility permit.

All groundwater monitoring wells shall have protective bollards or other devices installed around them if they are located in areas of high traffic flow in order to prevent damage to the well. Wells shall be clearly labeled, visible and locked when not in use, in order to minimize the potential for unauthorized access.

FDEP shall be notified in writing when any monitoring well is damaged or site conditions require a well to be abandoned. All wells shall be plugged so that they do not act as a conduit for leachate release to the groundwater.

2.3 MONITORING WELL SAMPLING AND ANALYSIS

FDEP shall be notified 14 days prior to conducting any routine sampling event, so that the Department may collect split samples. This routine sampling applies to MW-1R, MW-8A, MW-9, MW-10R, MW-15, MW-16, MW-17, MW-18R, MW-19A, and MW-20A.

Groundwater monitoring wells are sampled semi-annually for the following parameters:

Field Parameters

- Static water level before purging
- Specific conductance
- pH
- Dissolved oxygen
- Turbidity
- Temperature
- Colors and sheens by observation

Laboratory Parameters (Unfiltered)

- Total ammonia-nitrogen (Ammonia-N)
- Chlorides
- Nitrate
- Sulfate
- Total Dissolved Solids (TDS)
- Iron
- Manganese
- Mercury
- Sodium
- Those parameters listed in 40 Code of Federal Regulations (CFR) Part 258, Appendix I

Groundwater elevations will be measured at all active wells and piezometers during all sampling events to a precision of 0.01 foot. The water surface contour maps prepared for each sampling event will include ground water elevations (measured in feet NGVD) calculated for each well and piezometer well. In addition to the water level measurements taken from the groundwater monitoring wells, surface water elevations shall also be measured at the staff gauge locations listed in Table 2-2 for each sampling event. A water table surface elevation contour map shall be prepared for each set of water level measurements and submitted to FDEP for all routine ground water sampling events and monitoring plan evaluation reports. Figure 1 shows the location of staff gauges.

The above-referenced laboratory parameters will be compared to Groundwater Cleanup Target Levels (GCTLs), per Rule 62-777, F.A.C. However, certain parameters have been detected in background monitoring wells at concentrations greater than their GCTLs. Therefore, background water quality concentrations are proposed for the following parameters:

<u>Parameter</u>	Background Water Quality Concentration		
Sodium	456 mg/l		
Chloride	643 mg/l		

TABLE 2-2. STAFF GAUGE LOCATIONS AT CCSWDC

Gauge Name	Location
STW-1	Storm Pond 1
STW-2	Storm Pond 2
STW-3	Storm Pond 3
STW-4	Storm Pond 4
STW-5A	Storm Pond 5, west side
STW-5B	Storm Pond 5, east side
STW-6	Storm Pond 6
STW-7	Storm Pond 7

2.4 NATURAL ATTENUATION MONITORING WELLS

Between 2008 and 2011, a series of studies were conducted to determine the causes of elevated iron, ammonia, and arsenic concentrations in the groundwater at this facility. The studies are summarized in the above-referenced documents: "Natural Attenuation With Monitoring Plan" and "Background Groundwater Quality Assessment", which are on file with the FDEP. The studies recommended that natural attenuation with monitoring should be used as the site rehabilitation approach for this facility. The studies indicated that the elevated concentrations of arsenic, ammonia, and other constituents were the result of reductive dissolution conditions created in the site's groundwater by development of the landfill property. The studies noted that the reductive dissolution conditions should be reversed as the groundwater flows through the undeveloped portions of the property. The FDEP agreed, in principle, with the findings of these studies, and Natural Attenuation Monitoring was discussed at the July 17, 2013 meeting between Sarasota County Solid Waste staff and the FDEP. The proposed Natural Attenuation Monitoring program consists of collecting groundwater samples from the locations listed in Table 2-3.

Since 2008, compliance monitoring has been required at the Phase I portion of the landfill, and since 2010, compliance monitoring has been required at the Phase II portion of the landfill. A total of 10 compliance wells have been installed at this facility since 2008. The compliance monitoring was required due to the detections of elevated groundwater concentrations of primarily iron, ammonia, and arsenic, but also isolated occurrences of elevated concentrations of aluminum, chloride, manganese, sodium, and sulfate. The Natural Attenuation Monitoring program is intended to replace the need for compliance monitoring.

The Natural Attenuation Monitoring program includes sampling of four monitoring wells along the south and west sides of the landfill property, but within the undeveloped portions of the property. The Natural Attenuation Monitoring wells are used as temporary points of compliance and to monitor (and in place of) the zone of discharge. These monitoring wells are downgradient of the active landfill cells and will provide monitoring of the groundwater quality as the reductive dissolution process is replaced by more natural processes, along the pathway that the groundwater flows toward the site's boundaries.

Figure 1 shows the proposed locations of the Natural Attenuation Monitoring wells. The monitoring wells will be installed as discussed in Section 2.2.

TABLE 2-3. NATURAL ATTENUATION MONITORING WELLS AT CCSWDC

Well Number	WACS ID#	Aquifer Monitored	Purpose	Comments
NAM-1	TBD	Surficial	Natural Attenuation Monitoring	Utilize existing well PW-1
NAM-2	TBD	Surficial	Natural Attenuation Monitoring	Utilize existing well PW-2
NAM-3	TBD	Surficial	Natural Attenuation Monitoring	Utilize existing well PW-3
NAM-4	TBD	Surficial	Natural Attenuation Monitoring	Location of TPOC-1 from the 2010 NAM Plan

TBD = To be determined

2.5 NATURAL ATTENUATION MONITORING WELL SAMPLING AND ANALYSIS

FDEP shall be notified 14 days prior to conducting any Natural Attenuation Monitoring sampling event, so that the Department may collect split samples. Natural Attenuation Monitoring applies to the following wells: NAM-1, NAM-2, NAM-3, and NAM-4.

The Natural Attenuation Monitoring wells will have an initial sampling event that will meet the requirements of 62-701.510(7)(a) and (c), F.A.C, including mercury and nitrate.

Natural Attenuation Monitoring wells are sampled <u>semi-annually</u> for the following parameters:

Field Parameters

- Static water level before purging
- Specific conductance
- nH
- Dissolved oxygen

- Turbidity
- Temperature
- Colors and sheens (by observation)

<u>Laboratory Parameters (Unfiltered)</u>

Parameters required to be sampled as part of Consent Order 08-1728:

- Ammonia-N
- Arsenic
- Iron
- TDS

Parameters required to be sampled due to periodic exceedances of Rule 62-777, F.A.C. criteria in the detection wells:

Manganese

Groundwater elevations will be measured at all the Natural Attenuation Monitoring wells during all sampling events to a precision of 0.01 foot. The water surface contour maps prepared for each sampling event will include the Natural Attenuation Monitoring wells. It is expected that the Natural Attenuation Monitoring will be conducted concurrently with the standard groundwater monitoring, so that the water levels at the Natural Attenuation Monitoring wells can be used with the site-wide groundwater contour map.

The above-referenced laboratory parameters will be compared to Groundwater Cleanup Target Levels (GCTLs), per Rule 62-777, F.A.C., in order to evaluate the effectiveness of Natural Attenuation Monitoring as a remediation approach. The results for ammonia-N, arsenic, and manganese will be compared to their GCTLs. However, certain parameters have been detected in background monitoring wells at concentrations greater than their GCTLs. Therefore, background water quality concentrations are proposed for the following parameters:

<u>Parameter</u>	Background Water Quality Concentration		
Iron	6.3 mg/l		
TDS	1,924 mg/l		

SECTION 3.0

SURFACE WATER

3.1 SURFACE WATER MONITORING LOCATIONS

The surface water monitoring sites include Pond 1, along the north side of the active landfill, which is a downgradient (or downstream) surface water sampling location, and Pond 2, along the west side of the active landfill, which is also a downgradient (or downstream) surface water sampling location. The site characteristics are described in Table 3-1, and surface water monitoring locations are shown on Figure 1.

TABLE 3-1. SURFACE WATER MONITORING LOCATIONS AT CCSWDC

Surface Water Monitoring Location	WACS ID#	Water Body Monitored	Purpose
Pond 1 (at STW-1)	28824	Pond 1	Surface Water Collection and Downgradient
Pond 2 (at STW-2)	28825	Pond 2	Surface Water Collection and Downgradient

3.2 SURFACE WATER SAMPLING AND ANALYSIS

Surface water locations are sampled semi-annually for the following parameters:

Field Parameters

- Specific conductivity
- pH
- Dissolved oxygen
- Turbidity
- Temperature
- Colors and sheens (by observation)

Laboratory Parameters (Unfiltered)

- Chlorophyll A
- Total hardness (as mg/L CaCO₃)
- Total phosphorus (as mg/L P)
- Iron
- Mercury
- Nitrate
- Total nitrogen
- Un-ionized ammonia

- Biochemical oxygen demand (BOD₅)
- Chemical oxygen demand (COD)
- Total organic carbon (TOC)
- Total dissolved solids (TDS)
- Total suspended solids (TSS)
- Fecal coliform
- Those parameters listed in 40 CFR Part 258, Appendix I

SECTION 4.0

REPORTING

4.1 WATER QUALITY MONITORING REPORTS

Results of all sampling events shall be submitted to FDEP within 60 days from completion of laboratory analyses, unless a different due date has been specified in the permit. Water quality data shall be provided to the FDEP in an electronic format, unless an alternate form of submittal is specified. Form 62-701.900(31) (Attachment B), Water Quality Monitoring Certification, shall be used to certify that the laboratory results have been reviewed and approved by the county. At a minimum, the report shall include the following:

- 1. The facility name and identification number, sample collection dates and analysis dates;
- 2. All analytical results;
- 3. Identification number and designation of all surface water and groundwater monitoring points;
- 4. Applicable water quality standards;
- 5. Quality assurance, quality control notations;
- 6. Method detection limits;
- 7. STORET code numbers for all parameters;
- 8. Water levels recorded prior to evaluating wells or sample collection;
- 9. Updated groundwater table contour map signed and sealed by a professional geologist or profession engineer;
- 10. A summary of any water quality standards or criteria that are exceeded.

4.2 EVALUATION OF WATER QUALITY MONITORING PLAN

An evaluation of the water quality monitoring plan for the Central County Solid Waste Disposal Complex shall be conducted every two and one-half years. The WQMP evaluation is required to include an assessment of the effectiveness of the existing landfill design and operation as related to the prevention of groundwater contamination. A report detailing the findings and recommendations to improve the WQMP shall be submitted to the Florida Department of Environmental Protection. The requirements of F.A.C. 62-701.510(9)(b) include the following items that, at a minimum, must be included in the evaluation:

- 1. Tabular and graphical displays of any data which show that a monitoring parameter has been detected, including hydrographs for all monitoring wells.
- 2. Trend analyses of any monitoring parameters detected.
- 3. Comparisons among shallow, middle, and deep zone wells.
- 4. Comparisons between background water quality and the water quality in detection and compliance wells.

- 5. Correlations between related parameters such as total dissolved solids and specific conductance.
- 6. Discussion of erratic and/or poorly correlated data.
- 7. An interpretation of the groundwater contour maps, including an evaluation of groundwater flow rates.
- 8. An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based upon site conditions.

The following environmental professional was responsible for the preparation of this water quality monitoring plan:

Bradley J. Bayne, P.G. Senior Geologist, Atkins

Mr. Bayne is a Florida-registered professional geologist with over 22 years of experience in the planning and performance of environmental projects.

12 - 1 - 15

Date

Bradley J. Bayne

Florida P.G. #1733

Figure 1

Site Plan – CCSWDC (figure provided as part of permit renewal submittal)

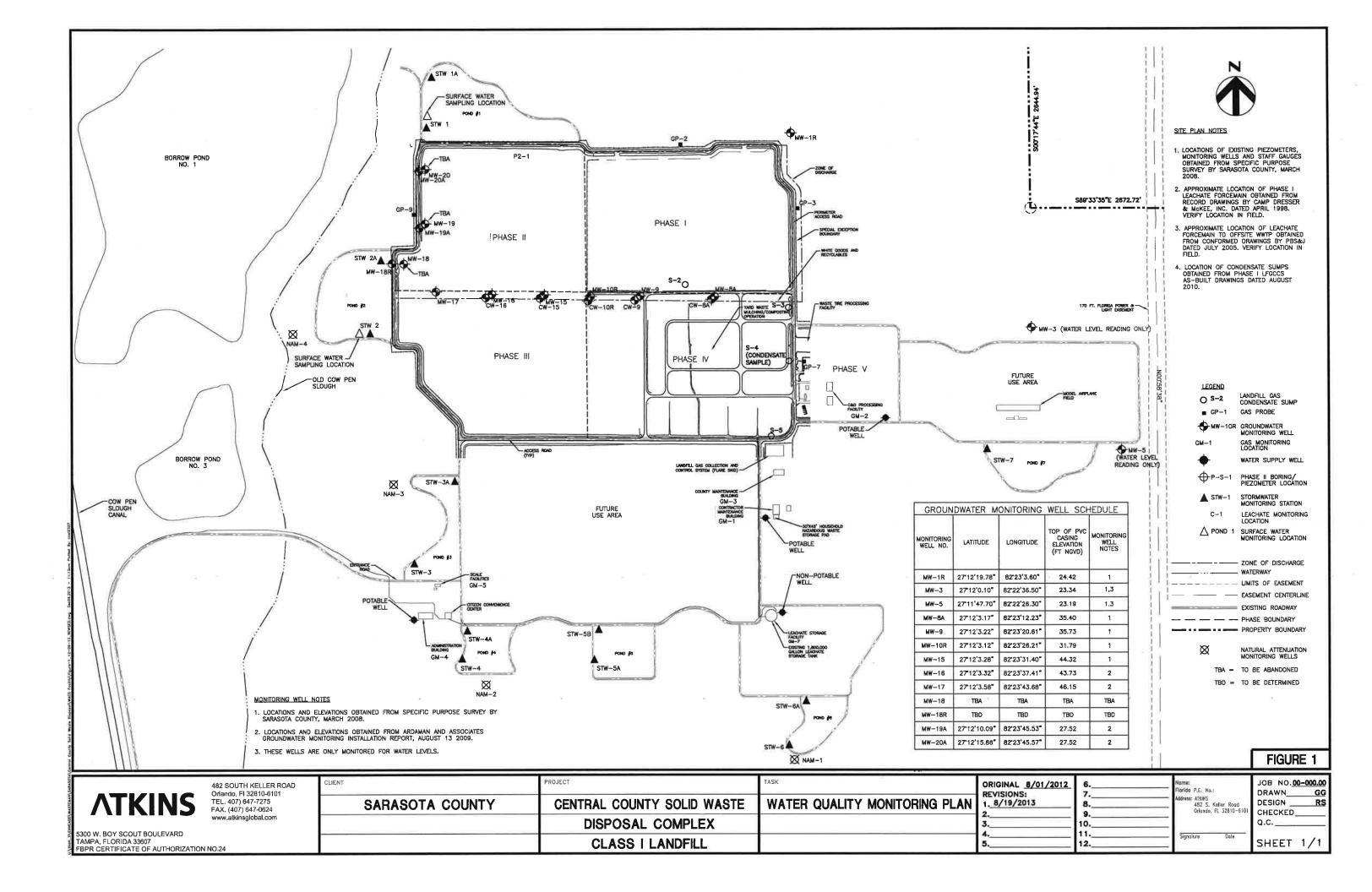


Figure 2

Typical Groundwater Monitoring Well

FIGURE 2: TYPICAL GROUNDWATER MONITORING WELL

Site: Central County Solid Waste Disposal Facility Typical Monitoring Well Well Identifier: Drilling Method: Hollow-Stem Auger Borehole Diameter: 8 Inches Total Depth: 16 - 29 feet below land surface 3-ft stick-up Surface Completion: 4" x 4" Aluminum standup protector encased in 4' x 4' x 2" concrete slab, with four concrete bollards Grade **Grout Seal** Portland Type Length 1 Foot + Well Casing -Diameter 2 Inches Seal **PVC** Type Type 30/65 Sand Schedule 40 Length 1 Foot Length 3 - 16 Feet Well Screen Filter Pack Diameter 2 inches Type 20/30 Sand Type **PVC** Length 11 Feet Slot 0.01-inch 10 Feet Length

Atkins

Note: Not to scale.

Attachment A

FDEP Form 62-701.900(30)

Monitoring Well Completion Report, page 1.



Department of Environmental Protection

Bob Martinez Center 2600 Blair Stone Road Tallahassee, Florida 32399-2400 DEP Form # 62-701 900(30)

Form Title: Monitoring Well Completion Report

Effective Date: January 6, 2010

Incorporated in Rule 62-701.510(3)

MONITORING WELL COMPLETION REPORT

DATE:				
FACILITY NAME:				
DEP PERMIT NO.: WACS_FACILITY:				
WACS MONITORING SITE_NUI	M.:	WACS_WELL:		
WELL_TYPE: BACKGROUND	DETECTION _	COMPLIANCE	=	
LATITUDE AND LONGITUDE (s	ee back for requirements):			
	Datum			
Collection Method	Collec	tion Date		
Collector Name	Collector Affilia	ation		
AQUIFER MONITORED:				
DRILLING METHOD:		DATE INSTALLED:		
INSTALLED BY:				
BORE HOLE DIAMETER:	TOTAL DEPTH:	(BLS)		
CASING TYPE:	CASING DIAMETER:	_ CASING LENGTH:		
SCREEN TYPE:	SCREEN SLOT SIZE:	SCREEN LENGTH: _		
SCREEN DIAMETER:(BLS)	SCREEN INTERVAL:	то		
FILTER PACK TYPE:	FILTER PACK	GRAIN SIZE:	:	
INTERVAL COVERED:	то	(BLS)		
SEALANT TYPE:	SEALANT INTERVAL:	то	_ (BLS)	
GROUT TYPE:	GROUT INTERVAL:	TO (BLS)		
TOP OF CASING ELEVATION (N	IGVD): GROUND SUF	RFACE ELEVATION (NGVD): _		
DESCRIBE WELL DEVELOPME	NT:			
POST DEVELOPMENT WATER	LEVEL ELEVATION (NGVD):			
DATE AND TIME MEASURED:				
REMARKS:				
)				
NAME OF PERSON PREPARING	REPORT:			
(Name Organization Phone No.	F.mail\			

NOTE: ATTACH AS-BUILT MW CONSTRUCTION DIAGRAM AND LITHOLOGIC LOG.(NGVD) NATIONAL GEODETIC VERTICAL DATUM OF 1988 (BLS) = BELOW LAND SURFACE

Attachment A

FDEP Form 62-701.900(30)

Monitoring Well Completion Report, page 2.

Latitude must be measured in degrees, minutes and seconds, to at least two (2) decimal places.

Longitude must be measured in degrees, minutes and seconds, to at least two (2) decimal places.

Eastings and northings (State Plane Coordinates) **must** be converted to latitude and longitude.

Coordinate Accuracy: the measured, estimated degree of correctness of the measurement. An accuracy of 15 feet or 5 meters is preferred.

Datum: the horizontal reference for measuring locations on the Earth's surface. NAD83-North American Datum of 1983 is preferred.

Elevation Datum: the reference datum from which elevation measurements are made. NGVD88 (National Geodetic Vertical Datum of 1988) is preferred.

Collection Method: the method or mechanism used to derive the measurements, e.g. GPS, map, aerial photo, etc.

Collection Date: the date and time on which the measurements were taken.

Collector Name: the name of the person taking the measurement.

Collector Affiliation: the agency or company for whom the collector works.

Attachment B

FDEP Form 62-701.900(31)

Water Quality Monitoring Certification



PART I GENERAL INFORMATION

Florida Department of Environmental Protection

DEP Form #: 62-701.900(31), F.A.C
Form Title: Water Quality Monitoring Certification

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Effective Date: January 6, 2010 Incorporated in Rule 62-701.510(9), F.A.C.

Bob Martinez Center 2600 Blair Stone Road Tallahassee, Florida 32399-2400

WATER QUALITY MONITORING CERTIFICATION

(1)	Facility Name		
	Address		
	City	Zip	County
	Telephone Number ()		
(2)	WACS Facility ID		
	DEP Permit Number		
(4)	Authorized Representative's Name		_Title
	Address		
	City	Zip	County
	Telephone Number ()		
	Email address (if available)		
doc the	ertify under penalty of law that I have personally examined nument and all attachments and that, based on my inquiry of information, I believe that the information is true, accurate alties for submission of false information including the possib	of those individuals e, and complete.	immediately responsible for obtaining I am aware that there are significant
			2 ⊨ 3
	(Date) (Owner or Au	ıthorized Represen	tative's Signature)
PAF	RT II QUALITY ASSURANCE REQUIREMENTS		
San	npling Organization		
Ana	lytical Lab NELAC / HRS Certification #	The same of the sa	3
Lab	Name	3144-2-7-1	the state of the s
	ress		
⊃ho	ne Number ()		
Ema	ail address (if available)	····	