Pasco County Florida

Water Monitoring Plan
West Pasco Class I Landfill
PA87-23, WACS # 45799

Revised April 2014

CDM Smith

WATER QUALITY MONITORING PLAN

Water Monitoring Plan
West Pasco Class I Landfill
PA87-23, WACS # 45799

Revised April 2014

Prepared for:
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Water Quality Monitoring Plan
For the West Pasco County Class I Landfill

1.0 Introduction

This Water Quality Monitoring Plan (WQMP) updates the WQMP for the West Pasco County Class I Landfill (Power Plant Siting Act Facility # PA-87-23, WACS ID #45799) dated December 2008. The initial WQMP for this facility was submitted to and approved by Florida Department of Environmental Protection (FDEP) in 1988 under the Power Plant Siting Act as Facility PA-87-23. The 2008 WQMP, was prepared by CDM Smith as part of the application to construct disposal unit A-4. The primary revisions to the 2008 WQMP are deletion of the leachate monitoring program in accordance with changes to Chapter 62-701.510, F.A.C. in 2012 and incorporation of monitor wells that were proposed in the December 2008 WQMP. The rationale for the selection of monitor well locations and their construction is described in detail in the previous WQMPs.

2.0 Groundwater Quality Monitoring Network

With the deletion of leachate monitoring, the water quality monitoring program includes the sampling and analyses of groundwater samples and measurement of groundwater levels. There are no existing or proposed surface water discharges to outside the property boundary. Therefore, surface water monitoring is not included.

The groundwater monitoring system meets the requirements in Chapter 62-701.510(3), F.A.C. Locations of monitor wells are shown on **Figure 1**. Detection wells are located downgradient from the ash disposal units A-1, A-2, A-3 and A-4, and the solid waste units SW-1 and SW-2. Wells 4MW-11D, 4MW-12D, 2MW-13D, 4MW-13D, 4MW-14D, 2MW-17S, 2MW-18D, 2MW-19D, 2MW-24S, 2MW-24D, 2MW-25S, 2MW-25D, 2MW-26S, and 2MW-26D are designated as detection wells. They are within 50 feet of the respective disposal units and are approximately 500 feet apart. Monitor wells 2MW-1, 4MW-1, 2MW-2, 4MW-2, 2MW-6, 4MW-6, 2MW-15DA, 2MW-27S, 2MW-27D, 4MW-27, and 4MW-27D are designated as background groundwater quality monitoring locations. Wells 2MW-4, 4MW-4, 2MW-5, and 4MW-5 are designated as compliance wells.

Table 1 is a summary of well construction information. Detection wells 2MW-13D, 2MW-17S, 2MW-24S, 2MW-25S, and 2MW-26S, background wells 2MW-1, 2MW-2, 2MW-6, and 2MW-27S, and compliance wells 2MW-4 and 2MW-5 are considered surficial aquifer wells. These wells are completed in sediments that would be considered the surficial if they are saturated. Detection wells 4MW-11D, 4MW-12D, 4MW-13D, 4MW-14D, 2MW-18D, 2MW-19D, 2MW-24D, 2MW-25D, and 2MW-26D, background wells 4MW-1, 4MW-2, 4MW-6, 2MW-15DA, 2MW-27D, 4MW-27, and 4MW-27D, and compliance wells 4MW-4 and 4MW-5 are designated as Floridan aquifer monitor wells.

3.0 Routine and Initial Groundwater Sampling and Analysis

The sampling and analysis procedures shall be performed in accordance with requirements specified in Chapter 62-160, F.A.C. Chemical analyses that are not performed by Pasco County will be contracted out under an agreement with other state-approved and NELAC-certified laboratories. Only procedures and methods approved by the Florida Department of Health and the Florida Department of Environmental Protection (the Department) will be used.

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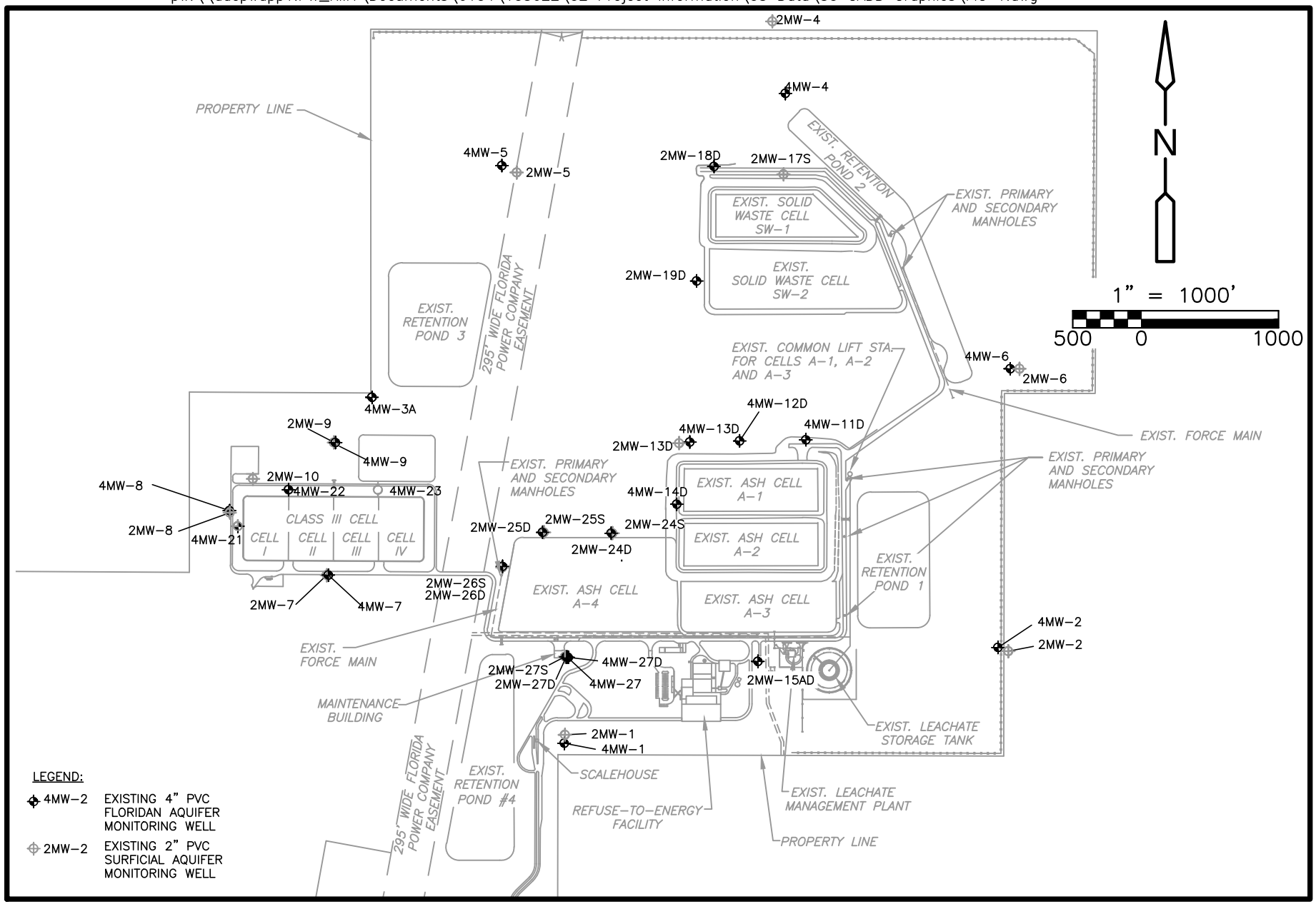

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Figure No. 1
Monitor Well Locations at the
West Pasco Class I and Class III Landfills

Table 1. Construction Summary of Monitor Wells - West Pasco Class I Landfill

Well I.D.	Well Designation	Location		Ground Elevation (ft NGVD)	Top of Casing (ft NGVD)	Riser Height (ft als)	Screened/Open Hole Section				Total Depth (ft bls)
		Latitude North	Longitude West				Well Type (dia.)	Length	Depth (ft bls)	Elevation (ft NGVD)	
Surficial Aquifer Monitor Wells											
2MW-1	Background	28 22' 05.8"	82 33' 48.1"	46.7	49.95	3.25	Screened (2")	10	8.5 - 18.5	38.2 - 28.2	18.5
2MW-2	Background	28 22' 12.3"	82 33' 11.9"	52.8	56.41	3.61	Screened (2")	5	29.5 - 34.5	23.3 - 18.3	34.5
2MW-4	Compliance	28 22' 57.7"	82 33' 31.4"	51.3	54.77	3.47	Screened (2")	5	10.5 - 15.5	40.8 - 35.8	15.5
2MW-5	Compliance	28 22' 46.7"	82 33' 52.2"	45.3	49.17	3.87	Screened (2")	4	4.0 - 8.0	41.3 - 37.3	8.0
2MW-6	Background	28 22' 32.7"	82 33' 11.1"	53.0	56.11	3.11	Screened (2")	10	20.0 - 30.0	33.0 - 23.0	30.0
2MW-13D	Detection	28 22' 27.2"	82 33' 38.7"	49.1	52.39	3.29	Screened (2")	9.5	7.8 - 17.3	41.3 - 31.8	18.0
2MW-17S	Detection	28 22' 47.8"	82 33' 30.5"	53.8	53.42	-0.38	Screened (2")	15	23.0 - 38.0	30.8 - 15.8	41.0
2MW-24S	Detection	28 22' 21.6"	82 33' 43.4"	47.4	50.37	2.97	Screened (2")	15	11.0 - 26.0	36.4 - 26.4	26.0
2MW-25S	Detection	28 22' 21.7"	82 33' 49.7"	45.3	47.84	2.57	Screened (2")	10	4.5 - 14.5	40.8 - 30.8	14.5
2MW-26S	Detection	28 22' 18.8"	82 33' 52.7"	51.1	54.16	3.06	Screened (2")	10	10.0 - 20.0	41.1 - 31.1	20.0
2MW-27S	Background	28 22' 12.8"	82 33' 47.4"	47.5	50.44	2.94	Screened (2")	10	8.0 - 18.0	39.5 - 29.5	18.0
Floridan Aquifer Monitor Wells											
4MW-1	Background	28 22' 05.5"	82 33' 48.1"	46.5	50.34	3.84	Screened (2")	28	32.0 - 60.0	14.5 - -13.5	60.0
4MW-2	Background	28 22' 12.2"	82 33' 11.9"	53.0	56.11	3.11	Screened (2")	28	42.0 - 70.0	11.0 - -17.0	70.0
4MW-4	Compliance	28 22' 52.5"	82 33' 30.3"	48.1	50.81	2.71	Screened (2")	28	22.0 - 50.0	26.1 - 0.5	50.0
4MW-5	Compliance	28 22' 47.2"	82 33' 53.4"	45.4	49.06	3.66	Screened (2")	32	68.0 - 100.0	-22.6 - -54.6	100.0
4MW-6	Background	28 22' 32.7"	82 33' 11.3"	52.4	55.93	3.53	Screened (2")	27	73.0 - 100.0	-20.6 - -47.6	100.0
4MW-11D	Detection	28 22' 27.5"	82 33' 28.5"	61.9	65.00	3.10	Screened (2")	25	27.0 - 52.0	34.9 - 9.9	52.0
4MW-12D	Detection	28 22' 27.4"	82 33' 33.9"	51.8	55.03	3.23	Screened (2")	25	30.0 - 55.0	21.8 - -3.2	55.0
4MW-13D	Detection	28 22' 27.3"	82 33' 38.1"	51.2	54.04	2.84	Screened (2")	10	26.0 - 36.0	25.2 - 15.2	36.0
4MW-14D	Detection	28 22' 22.8"	82 33' 39.0"	49.0	52.00	3.00	Screened (2")	25	25.0 - 50.0	24.0 - -1.0	50.0
2MW15AD	Background	28 22' 22.6"	82 33' 32.1"	51.9	54.71	2.85	Screened (2")	10	34.0 - 44.0	17.9 - 7.9	44.0
2MW-18D	Detection	28 22' 47.2"	82 33' 36.1"	50.0	52.75	2.75	Screened (2")	15	25.0 - 40.0	25.0 - 10.0	40.0
2MW19D	Detection	28 22' 39.0"	82 33' 37.3"	50.0	52.25	2.23	Screened (2")	10	45.0 - 55.0	5.5 - -5.0	55.0
2MW-24D	Detection	28 22' 21.6"	82 33' 43.4"	47.4	50.55	3.15	Screened (2")	10	34.0 - 44.0	13.4 - 3.4	44.0
2MW-25D	Detection	28 22' 21.7"	82 33' 49.5"	45.2	47.87	2.67	Screened (2")	15	17.0 - 32.0	28.2 - 13.2	32.0
2MW-26D	Detection	28 22' 18.9"	82 33' 52.7"	51.2	54.13	2.93	Screened (2")	10	42.0 - 52.0	9.2 - -0.8	52.0
2MW-27D	Background	28 22' 12.7"	82 33' 47.3"	47.2	50.32	3.12	Screened (2")	15	27.0 - 42.0	20.2 - 5.2	42.0
4MW-27	Background	28 22' 12.8"	82 33' 46.9"	46.8	49.60	2.80	Openhole (4" csg)	10	67.0 - 77.0	-20.2 - - 30.2	77.0
4MW27D	Background	28 22' 12.8"	82 33' 47.1"	46.3	49.28	3.01	Openhole (4" csg)	10	146.0 - 156.0	-99.7 - -100.7	156.0

NOTES:

NGVD	National Geod National Geodetic Vertical Datum
ft als	feet above lan feet above land surface
ft bls	feet below lan feet below land surface
dia.	diameter

Routine groundwater samples will be collected on a semi-annual basis from all background, detection, and compliance monitor wells designated in Section 2.1 provided a sufficient volume of water can be obtained after purging. Prior to sampling, water levels will be measured in all wells. Samples will be analyzed for the parameters listed in Chapter 62-701.510(7)(a), F.A.C. These parameters are also listed in **Table 2**. New monitor wells installed in association with the Class I landfill will be analyzed for the parameters listed in Chapter 62-701.510(7)(a) and Chapter 62-701.510(7)c, F.A.C. for the initial sampling event in accordance with Chapter 62-701.510(5)(b)1 unless otherwise approved by the Department. Groundwater samples from all of the detection and downgradient compliance wells designated in Section 2.1 of this plan and future detection and downgradient compliance monitor wells to be installed in association with the Class I Landfill at this facility will be collected and analyzed on a semi-annual basis unless otherwise approved by the Department. These samples will be analyzed for the parameters listed in Chapter 62-701.510(7)(a) unless otherwise approved by the Department.

4.0 Surface Water Monitoring System

The stormwater management system implemented at the facility consists of a series of ditches, culverts, and an existing detention pond. The drainage ditches at each of the cells are designed to receive runoff from the developed and closed-out portions of the landfill areas and transport it to the existing stormwater pond. The drainage ditches and culverts have been designed to carry the runoff from a 25-year 24-hour storm event. There are no designed pathways for the discharge of stormwater to surface water bodies located outside the boundaries of the facility.

However, in the event that a discharge of surface water from the facility should occur, a sample will be collected at the point of discharge from the property. If the discharge is into a flowing body of water located outside the boundary of the facility, a sufficient number of upgradient and downgradient sample locations will be used to allow the effect of the discharge from the landfill to be measured.

5.0 Water Quality Monitoring Reporting

5.1 Routine Semi-Annual Reporting

The County will report all water quality monitoring results to the Department semi-annually in accordance with the requirements of Chapter 62-701.560(8)(a). The County will notify the Department at least 14 days before the sampling is scheduled to occur so that the Department may collect split samples. The report will contain the following data:

- The facility name and identification number, sample collection dates, and analysis dates;
- All analytical results, including all peaks even if below maximum contaminant levels;
- Identification number and designation of all monitoring points;
- Applicable water quality standards;
- Quality assurance, quality control notations;
- Method detection limits;
- STORET code numbers for all parameters;

Table 2. West Pasco County Class I Landfill
Routine Groundwater Quality Monitoring Parameter List

Parameter	Storet Code	Regulatory Criteria	Units
Field Parameters			
pH	000406	6.5 - 8.5	S.U.
Specific conductivity	000402	NA	umhos/cm
Dissolved oxygen (DO)	000300	NA	mg/L
Turbidity	082078	NA	NTU
Temperature	000010	NA	deg. C
Static water level in well (.01 ft)	072020	NA	ft. NGVD
Colors and sheens (by Observation)		NA	
Laboratory Parameters			
Ammonia as N	000610	2.8	mg/L
Chlorides	000940	250	mg/L
Iron	001045	300	µg/L
Mercury	071900	0.002	mg/L
Nitrate	000620	10	mg/L
Sodium	000929	160	mg/L
Total Dissolved Solids (TDS)	000515	500	mg/L
40 CFR Part 258 Appendix I Parameters			
Inorganic Constituents:			
Antimony (total)	001097	0.006	mg/L
Arsenic (total)	001002	0.010	mg/L
Barium (total)	001007	2	mg/L
Beryllium (total)	001012	0.004	mg/L
Cadmium (total)	001027	0.005	mg/L
Chromium (total)	001034	0.1	mg/L
Cobalt (total)	001037	140	µg/L
Copper (total)	001042	1	mg/L
Lead (total)	001051	0.015	mg/L
Nickel (total)	001067	0.1	mg/L
Selenium (total)	001147	0.05	mg/L
Silver (total)	001077	0.1	mg/L
Thallium (total)	001059	0.002	mg/L
Vanadium (total)	001087	49	µg/L
Zinc (total)	001092	5	mg/L

Parameter	Storet Code	Regulatory Criteria	Units
40 CFR Part 258 Appendix I Parameters (continued)			
Organic Constituents (continued):			
Acetone	081552	6300	µg/L
Acrylonitrile	034215	0.06	µg/L
Benzene	034030	1	µg/L
Bromochloromethane	077297	91	µg/L
Bromodichloromethane	032101	0.6	µg/L
Bromoform (Tribromomethane)	032104	4.4	µg/L
Carbon disulfide	081309	700	µg/L
Carbon tetrachloride	032102	3	µg/L
Chlorobenzene	034301	100	µg/L
Chloroethane (Ethyl chloride)	034311	12	µg/L
Chloroform (Trichloromethane)	032106	70	µg/L
Dibromochloromethane (Chlorodibromomethane)	032105	0.4	µg/L
1,2-Dibromo-3-chloropropane (DBCP)	038760	0.2	µg/L
1,2-Dibromoethane (Ethylene dibromide), (EDB)	077651	0.02	µg/L
o-Dichlorobenzene (1,2-Dichlorobenzene)	034536	600	µg/L
p-Dichlorobenzene (1,4-Dichlorobenzene)	034571	75	µg/L
trans–1,4-Dichloro-2-butene	077268	NA	
1,1-Dichloroethane (Ethylidene chloride)	034496	70	µg/L
1,2-Dichloroethane (Ethylene dichloride)	034531	3	µg/L
1,1-Dichloroethylene (1,1-Dichloroethene)	034501	7	µg/L
cis-1,2-Dichloroethylene	077093	70	µg/L
trans-1,2-Dichloroethylene	034546	100	µg/L
1,2-Dichloropropane (Propylene dichloride)	034541	5	µg/L
cis-1,3-Dichloropropene	034704	NA	
trans-1,3-Dichloropropene	034699	NA	
Ethylbenzene	034371	30	µg/L
2-Hexanone (Methyl butyl ketone)	045034	280	µg/L
Methyl bromide (Bromomethane)	034413	9.8	µg/L

Table 2. West Pasco County Class I Landfill
Routine Groundwater Quality Monitoring Parameter List

Parameter	Storet Code	Regulatory Criteria	Units	Parameter	Storet Code	Regulatory Criteria	Units
40 CFR Part 258 Appendix I Parameters (continued)				**40 CFR Part 258 Appendix I Parameters (continued)**			
Organic Constituents (continued):				**Organic Constituents (continued):**			
Methyl chloride (Chloromethane)	034418	2.7	µg/L	Tetrachloroethylene (Perchloroethylene)	034475	3	µg/L
Methylene bromide (Dibromomethane)	077596	70	µg/L	Toluene	078131	40	µg/L
Methylene chloride (Dichloromethane)	034423	5	µg/L	1,1,1-Trichloroethane (Methylchloroform)	034506	200	µg/L
Methyl ethyl ketone (2-Butanone), (MEK)	081595	4200	µg/L	1,1,2-Trichloroethane	034511	5	µg/L
Methyl iodide (Iodomethane)	077424	NA		Trichloroethylene (Trichloroethene)	039180	3	µg/L
4-Methyl-2-pentanone (Methyl isobutyl ketone)	081596	560	µg/L	Trichlorofluoromethane (CFC-11)	034488	2100	µg/L
				1,2,3-Trichloropropane	077443	0.02	µg/L
Styrene	077128	100	µg/L	Vinyl acetate	077057	88	µg/L
1,1,1,2-Tetrachloroethane	077562	1.3	µg/L	Vinyl chloride	039175	1	µg/L
1,1,2,2-Tetrachloroethane	034516	0.2	µg/L	Xylenes	081551	20	µg/L

Notes:

µg/L = micrograms per liter

mg/L = miligram per liter

S.U. = Standard Units

umhos/cm = micromhos per centimeters

NTU = Nephelometric Turbidity Units

deg. C = Degrees Celsius

ft NGVD = feet above National Geodetic Vertical Datum

NA = Not Applicable

- Water levels recorded prior to evaluating wells or sample collection. Elevation reference shall include the top of the well casing and land surface at each well site at a precision of plus or minus 0.01 foot (using a consistent, nationally recognized datum);
- An updated ground water table contour map signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations, with contours at no greater than one-foot intervals unless site-specific conditions dictate otherwise, which indicates ground water elevations and flow direction; and
- A summary of any water quality standards or criteria that are exceeded.

The report will be submitted electronically in Portable Document File (PDF) format. Analytical and field data will also be reported in the Department's Automated Data Processing Tool (ADaPT) format.

5.2 Technical Report

Every two and one-half years, the County will submit to the Department a technical report (Water Quality Monitoring Plan Evaluation Report) summarizing and interpreting the water quality data and water level measurements collected during the past five routine monitoring events. The report will be prepared, signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations. The report will contain, at a minimum, the following data:

- Tabular displays of any data which shows that a monitoring parameter has been detected, and graphical displays of any leachate key indicator parameters detected (such as pH, specific conductance, TDS, TOC, sulfate, chloride, sodium and iron), including hydrographs for all monitor wells;
- Trend analyses of any monitoring parameters detected;
- Comparisons among shallow, middle, and deep zone wells as appropriate;
- Comparisons between upgradient and downgradient wells;
- Correlations between related parameters such as total dissolved solids and specific conductance;
- Discussion of erratic and/or poorly correlated data;
- An interpretation of the groundwater contour maps, including an evaluation of groundwater flow rates;
- An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based upon site conditions.

The report will be submitted electronically in PDF format. The last report covered the years 2011 and 2012 and was due by March 31, 2013.

6.0 Evaluation Monitoring, Prevention Measures and Corrective Action

6.1 Evaluation Monitoring

If monitoring parameters are detected in detection wells in concentrations which are significantly above background water quality, or which are at levels above the Department's water quality standards or criteria specified in Chapter 62-520, F.A.C., the County may resample the wells within 30 days after the sampling data is received, to confirm the data. Should the County choose not to resample, the Department may consider the water quality analysis as representative of current ground water conditions at the facility. If the data is confirmed, or if the County chooses not to resample, the County shall notify the Department in writing within 14 days of this finding. Upon notification by the Department, the County shall initiate evaluation monitoring as follows unless otherwise approved by FDEP:

Routine monitoring of all monitoring wells shall continue according to the requirements of Chapter 62-701.510(6)(c), F.A.C. unless otherwise approved by the Department.

Within 90 days of initiating evaluation monitoring and annually thereafter, the County shall sample and analyze a representative sample of the background wells and all affected detection wells for the parameters listed in Chapter 62-701.510(7)(a), F.A.C.. Any new parameters detected and confirmed in the affected downgradient wells shall be added to the routine ground water monitoring parameter lists required in Chapter 62-701.510(6), F.A.C. for the affected wells.

Within 90 days of initiating evaluation monitoring, the County shall install (if necessary) and sample compliance monitoring wells at the compliance line of the zone of discharge and downgradient from the affected detection monitoring wells. These wells shall be installed according to the requirements of Chapter 62-701.510(3)(d), F.A.C. and samples from these wells and the affected detection wells shall be analyzed quarterly for the parameters listed in Chapter 62-701.510(7)(a) and Chapter 62-701.510(7)(c), F.A.C. unless otherwise approved by the Department.

Within 180 days of initiating evaluation monitoring, the County shall submit a contamination evaluation plan to the appropriate Department District Office. This plan shall be designed to delineate the extent and cause of the contamination, in order to predict the likelihood that Department water quality standards will be violated outside the zone of discharge, and to evaluate methods to prevent any such violations. After the Department and the County agree that the plan is so designed, the County shall implement this plan and submit a contamination evaluation report in accordance with the plan. All reasonable efforts shall be made by the County to prevent further degradation of water quality from the landfill activities.

The County shall not discontinue evaluation monitoring, and return to routine monitoring only, until authorized to do so by the Department.

6.2 Prevention Measures and Corrective Actions

If a contamination evaluation report submitted by the County within 180 days of initiating evaluation monitoring indicates that water quality standards are likely to be violated outside the zone of discharge, the County shall, within 90 days, submit a prevention measures plan to the Department. Upon approval, the County shall initiate the approved prevention measures to prevent such violations. If any contaminants are detected and confirmed in compliance wells in concentrations which exceed

both background levels and Department water quality standards or criteria, or are detected and confirmed in detection wells in concentrations which are above Department water quality minimum criteria, the County shall notify the Department within 14 days of this finding and shall initiate corrective actions. Evaluation monitoring shall continue according to the requirements of Chapter 62-701.510(7)(a), F.A.C.