Morris, John R.

From: Rojas, David <RojasDR@cdmsmith.com>
Sent: Friday, October 02, 2015 3:26 PM
To: Morris, John R.
Cc: 'jpower@pascocountyfl.net' (jpower@pascocountyfl.net); Schmaus, Nathan; Moore, Clark B.; ADaPT EDD (Shared Mailbox); Beeson, William; Crosby, Donna
Subject: Semester I 2013 – Semester I 2015 Water Quality Monitoring Plan Evaluation Report for the West Pasco Class III Landfill WACS Facility No.: SWD/51/45920
Attachments: West Pasco Class III LF WQMPER 2013-2015_reduced.pdf

Mr. John R. Morris, P.G.
Solid Waste Section
Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, FL 33637

Dear Mr. Morris:

CDM Smith Inc. (CDM Smith), on behalf of Pasco County, is submitting the Semester I 2013 – Semester I 2015 Water Quality Monitoring Plan Evaluation Report for the West Pasco Class I Landfill (attached). This report is submitted in accordance with Section V.H.10 of the Water Quality Monitoring Plan attached as Appendix 3 to the permit issued on November 22, 2013. Please let me know if you have any questions/comments or if you would like a hard-copy of the report.

Sincerely,

David R. Rojas, P.G.
Environmental Scientist/Geologist

CDM Smith
1715 N. Westshore Blvd. Suite 875
Tampa, Florida 33607
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October 2, 2015

Mr. John R. Morris, P.G.
Solid Waste Section
Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, FL 33637
SWD_Waste@dep.state.fl.us

Subject: Semester I 2013 – Semester I 2015 Water Quality Monitoring Plan Evaluation Report
West Pasco Class III Landfill
Permit No: 26254-001-SO/T3
WACS Facility No.: SWD/51/45920
PCU# 08-032.00
CDM Smith Project #6104-107265

Dear Mr. Morris:

CDM Smith Inc. (CDM Smith), on behalf of Pasco County, is submitting the Semester I 2013 – Semester I 2015 Water Quality Monitoring Plan Evaluation Report for the West Pasco Class III Landfill. This report is submitted in accordance with Section V.H.10 of the Water Quality Monitoring Plan attached as Appendix 3 to the permit issued on November 22, 2013. Please let me know if you have any questions/comments or if you would like a hard-copy of the report.

Sincerely,

David R. Rojas, P.G.
Environmental Scientist
CDM Smith Inc.

cc: Mr. John Power, Pasco County
Mr. Clark Moore, FDEP – Tallahassee, FL. Clark.B.Moore@dep.state.fl.us
Solid Waste Program Site, FDEP ADaPT.EDDs.and.Reports@dep.state.fl.us
Mr. Nathan Schmaus, CDM Smith

Pasco County Florida

Water Quality Monitoring Plan Evaluation Report
Semester I 2013 - Semester I 2015
West Pasco Class III Landfill
Permit# 26254-003-SO/T3
WACS ID# SWD/51/45920
PCU# 08-032.00

October 2015

CDM Smith

Water Quality Monitoring Plan Evaluation Report for Semester I 2013 - Semester I 2015 West Pasco Class III Landfill Permit# 26254-003-SO/T3 WACS ID# SWD/51/45920 PCU# 08-032.00

October 2015

CERTIFICATION

I hereby certify that I have examined the site, and being familiar with the provisions of 62-701, F.A.C., attest that this evaluation has been prepared in accordance with good engineering practices.

Engineer: David R. Rojas

Signature:

DAVID R. ROJAS LICENSE No.PG2362 STATE OF FLORIDA PROFESSIONAL GEOLOGIST

Professional Geologist
Registration Number: PG2362

State: Florida

Date: 10-2-15

Table of Contents

Appendix

List of Figures

List of Tables

Section 1
Introduction

1.1 Background

This Water Quality Monitoring Plan Evaluation Report (WQMPER) is provided to satisfy requirements of Chapter 62-701.510(8)(b) and the operating permit for the West Pasco Class III Landfill (site). This WQMPER covers the monitoring period from Semester I 2013 through Semester I 2015.

The site is located at the Pasco County Resource Recovery Facility (PCRRF). The facility is located in northwest Pasco County, approximately 2.5 miles north of State Road 52 at 14230 Hays Road, Spring Hill, Florida. **Figure 1-1** is a site plan showing the four approximately five-acre Class III disposal cells, and other nearby features. The Class III landfill is permitted to operate under Permit No. 26254-003-SO/T3 which was issued on November 22, 2013.

Construction and demolition (C&D) debris that is received at the facility is directed to the Class III disposal cells. The filling of Cell #1 began in June of 1990 and reached its first lift level in May of 2002. The site is designed to include a second lift after all four cells are filled to the first level. The filling of the first lift in Cell #2 began in June of 2002. Cell #2 is the only cell being filled with debris at this time.

The Class III landfill is constructed with a geosynthetic liner and leachate collection system. Collected leachate is directed to one of the two underground storage tanks referred to as Tanks 1 and 2. The leachate received by the tanks is piped directly to the adjacent Shady Hills Advanced Wastewater Treatment Facility.

1.2 Water Quality Monitoring Plan

Water quality monitoring requirements for Semester I and Semester II of 2013 were specified in Part E of Permit No. 26254-001-SO/T3 dated November 7, 2008. Water quality monitoring requirements for Semester I of 2014 through Semester I of 2015 are specified in the Water Quality Monitoring Plan (WQMP) attached as Appendix 3 to the permit issued on November 22, 2013. Routine groundwater monitoring at the site is performed semi-annually in accordance with Section I, Section II.3, Section V.A.1, and Section V.F.8 of the WQMP. Monitor wells 2MW-7 and 4MW-7 are designated as background groundwater quality monitoring locations. Wells 4MW-21 and 4MW-22 are designated as detection wells. Groundwater samples are collected semi-annually from monitor wells 2MW-7, 4MW-7, 4MW-21, and 4MW-22 as specified in Section II.3 of the WQMP. There are no surface water monitoring locations designated at the site; however, in the event that a discharge to surface water from the site should occur, sampling is performed at a location where the discharged stormwater exits the property in accordance with Section III of the WQMP.

In accordance with Section V.F.8 of the WQMP, groundwater level measurements are collected from all monitor wells, piezometers, and surface water sites within a one-day period during each

sampling event. In accordance with Section II.1 of the WQMP, monitor wells 2MW-3A, 4MW-3A, 2MW-8, 4MW-8, 2MW-9, 4MW-9, and 2MW-10 are designated as piezometers. Although groundwater samples are not required to be collected from piezometers as part of the routine groundwater monitoring at the site, they were collected semi-annually from piezometers 4MW-8, and 4MW-9 by Pasco County and the results were included in the analytical reports submitted to FDEP. Because these data were not required to be submitted, the analytical results for samples from these piezometers are not included or discussed in this report. Locations of wells and piezometers are shown on Figure 1-1. **Table 1-1** is a construction summary of all active monitor wells and piezometers for the Class III landfill.

Until the permit was renewed in November 2013, collection and analysis of leachate samples was required from Tanks 1 and 2. Leachate samples were collected in 2013. Leachate sampling and analysis is no longer required pursuant to revisions to Chapter 62-701, F.A.C. in 2012 and the permit issued in 2013.

Groundwater samples are collected and analyzed in accordance with quality assurance requirements specified in Section I of the WQMP. The samples are collected by Pasco County personnel and the analyses are performed by the Pasco County Laboratory and a subcontracted laboratory. Southern Analytical Laboratory was the subcontracted laboratory for all of the sampling events conducted during this monitoring period.

1.3 Report Contents and Organization

This Water Quality Monitoring Plan Evaluation Report (WQMPER) includes monitoring data from Semester I of 2013 through Semester I of 2015 as specified in Section V.H.10 of the WQMP. As required by Chapter 62-701.510(8)(b), F.A.C., as referenced in Section V.H.10 of the WQMP, this report includes the following:

- Tabular displays of data, which shows that a monitoring parameter has been detected, graphical displays of any leachate key indicator parameters detected (such as pH, specific conductance, TDS, TOC, sulfate, chloride, sodium and iron), and hydrographs for all monitor wells;
- Trend analyses of monitoring parameters consistently detected;
- Comparisons between data from surficial aquifer and Floridan aquifer wells, as appropriate;
- Comparisons between background water quality and the water quality in samples from detection wells;
- Correlations between related parameters;
- Discussion of erratic and/or poorly correlated data;
- An interpretation of the ground water contour maps, including an evaluation of ground water flow rates; and

- An evaluation of the adequacy of the water quality monitoring frequency and sampling locations based upon site conditions.

The report is divided into four sections. Section 1 is an overview of the facility and water quality monitoring program for the West Pasco Class III Landfill. Section 2 presents and discusses groundwater level data. Section 3 presents and discusses groundwater quality data, the results of leachate monitoring, and interpretations of the data. Section 4 presents conclusions and recommendations based on the evaluations.

Table 1-1. Construction Summary of Existing Monitor Wells and Piezometers West Pasco Class III Landfill

Well I.D.	Location		Ground Elevation		Top of Casing		Screened Section					Top of LS	Total Depth
	Latitude North	Longitude West	(ft NAVD)	(ft NGVD)	(ft NAVD)	(ft NGVD)	Well Type (dia.)	Length	Depth (ft bls)	Elevation (ft NGVD)	Lithology	(ft bls)	(ft bls)
Surficial Aquifer													
2MW-3	28° 22' 26"	82° 34' 18"	45.80	46.79	49.02	50.01	Screened (2")	5	9.5 - 14.5	37.29 to 32.29	SD	23.0	15.0
2MW-7	28° 22' 19"	82° 34' 07"	48.97	49.96	51.76	52.75	Screened (2")	6	6.0 - 12.0	43.96 to 37.96	SD	30.0	12.0
2MW-8	28° 22' 23"	82° 34' 15"	48.43	49.42	50.98	51.97	Screened (2")	5	7.0 - 12.0	42.42 to 37.42	SD & Cly SD	25.0	13.0
2MW-9	28° 22' 28"	82° 34' 06"	49.20	50.19	51.30	52.29	Screened (2")	7	4.0 - 11.0	46.19 to 39.19	SD	28.0	11.0
2MW-10	28° 22' 25"	82° 34' 13"	47.82	48.81	51.64	52.63	Screened (2")	7	5.0 - 12.0	43.81 to 36.81	SD	25.0	12.0
Floridan Aquifer													
4MW-3A	28° 22' 31"	82° 34' 03"	49.55 (conc)	50.54 (conc)	51.93	52.92	Screened (2")	28	22.0 - 50.0	28.54 to 0.54	LS	22.0	50.0
4MW-7	28° 22' 19"	82° 34' 07"	48.76	49.75	51.63	52.62	Screened (2")	25	22.0 - 47.0	27.75 to 2.75	CL & LS	30.0	50.0
4MW-8	28° 22' 23"	82° 34' 15"	48.78	49.77	50.88	51.87	Screened (4")	33	32.0 - 65.0	17.77 to -15.23	LS	25.0	65.0
4MW-9	28° 22' 28"	82° 34' 06"	49.35	50.34	51.79	52.78	Screened (4")	30	30.0 - 60.0	20.34 to -9.66	CL & LS	28.0	60.0
4MW-21	28° 22' 22"	82° 34' 14"	Not Measured	49.10	Not Measured	51.46	Screened (2")	15	24.2 - 39.2	24.90 to 9.90	CL & SD	>40.0	40.0
4MW-22	28° 22' 25"	82° 34' 10"	Not Measured	50.85	Not Measured	53.44	Screened (2")	15	30.3 - 45.3	20.55 to 5.55	CL & LS	29.0	46.0

NOTES:

Lithology of Screened interval and Top of Limestone are based on cross-section interpretation or information from boring logs.

Elevation Data in NAVD are from Pasco County Engineering Sves Survey dated 1/22/07.

Elevation Data in NGVD for all wells except 4MW-21 & 4MW-22 are from Pasco County Engineering Sves Survey dated 1/22/07 converted to NGVD.

Elevation Data in NGVD for 4MW-21 & 4MW-22 are from Pasco County Engineering Sves Survey dated 12/1/08.

Section 2
Groundwater Level Data

2.1 Groundwater Levels

Water level measurements were collected by Pasco County personnel in accordance with Section V.F.8 of the WQMP during each sampling event conducted during the Semester I 2013 through Semester I 2015 reporting period. Groundwater level elevation and gradient data are in **Table A-1 (Appendix A).** Monitor well 2MW-7 and piezometers 2MW-3A, 2MW-8, 2MW-9, and 2MW-10 are screened in materials, which if saturated, would be the surficial aquifer. These wells have been dry since 1995. Water levels measured in monitor wells 4MW-7, 4MW-21, and 4MW-22, and piezometers 4MW-3A, 4MW-8, and 4MW-9 are completed in sediments that are considered to be the Floridan aquifer.

Hydrographs for the Floridan aquifer wells are presented in **Figure A-1** (Appendix A). Evaluations of the hydrographs generally indicate seasonal variations in the water levels in 2013 and 2014, and higher than expected water levels in the first semester of 2015. The groundwater levels were approximately two feet higher in September 2013 than in March 2013 and approximately three feet higher in October 2014 than in March 2014. The higher groundwater levels in the second semesters of 2013 and 2014 are attributed to typical seasonal fluctuations. Most of the hydrographs indicate that the highest groundwater levels during the Semester I 2013 through Semester I 2015 reporting period were recorded during the March 2015 event. The high groundwater levels in March 2015 are attributed to abnormally high rainfall in early 2015.

2.2 Direction and Rate of Groundwater Movement

All of the designated surficial aquifer wells at the Class III facility were dry throughout the monitoring period. Groundwater contour maps of the Floridan aquifer at the facility during the Semester I 2013 – Semester I 2015 reporting period are presented in Appendix A. The contour maps were prepared using data from the Floridan aquifer wells listed above and Floridan aquifer wells that are part of the Class I landfill monitoring system. The direction of groundwater water movement in the Floridan aquifer beneath the Class III landfill is generally from southwest to northeast beneath the westernmost cell and to generally from southeast to northwest beneath the eastern three cells. Overall, the gradient is generally to the north. A gradient was not calculated for the March 2013 event because water level data from at least two of the wells are considered questionable and, when contoured, show the direction of groundwater movement in nearly the opposite direction than is typical. The gradients for each of the other four monitoring events of this monitoring period were estimated using a three-point solution using water level data from piezometers 4MW-3A, 4MW-7, and 4MW-8. The results of the gradient calculations are shown on Table A-1 (Appendix A). The average hydraulic gradient during the monitoring period was 0.0023. The maximum gradient was 0.0037 and the lowest was 0.0017.

The rate of groundwater movement was estimated using the two-dimensional form of Darcy's Law below:

$$V_s = \frac{K_H\, i}{n_e}$$

where: V_s = Horizontal seepage velocity or rate (feet/day)

K_H = Horizontal hydraulic conductivity (feet/day)

i = Hydraulic gradient

n_e = Effective porosity

The average hydraulic gradient during the monitoring period (0.0023), a hydraulic conductivity value of 9.0 feet/day and an effective porosity of 15% (from the March 2008 WQMP for the Class III landfill prepared by CDM Smith) were used to calculate the horizontal seepage rate. These data indicate that the average rate of groundwater movement is approximately 0.14 foot/day or just over 50 feet/year.

Section 3
Groundwater and Leachate Quality

3.1 Groundwater Quality

3.1.1 Groundwater Data

Table B-1 (**Appendix B**) summarizes field parameter measurements and detected analytes from groundwater sampling events conducted during the Semester I 2013 through Semester I 2015 reporting period. Concentration versus time graphs (**Figures B-1** through **B-21**) for all analytes that were detected consistently (three times or more) in samples from detection and background wells during the Semester I 2013 through 2015 reporting period are also in Appendix B.

3.1.2 Background Wells

Monitor well 2MW-7, the well designated as the surficial aquifer background well for the Class III landfill in Section II.1 of the WQMP, remained dry throughout the reporting period. In addition, all of the piezometers that are completed in strata that would, if saturated, comprise the surficial aquifer were also dry throughout the reporting period. Therefore, there is no background groundwater quality data for the surficial aquifer at the Class III landfill.

No parameters were detected above Maximum Contaminant Levels (MCLs) established in Chapter 62-550, F.A.C. or Groundwater Cleanup Target Levels (GCTLs) established in 62-777, F.A.C. in well 4MW-7, the well designated as the Floridan aquifer background in Section II.1 of the WQMP. The pH values of samples collected from 4MW-7 were within the acceptable range.

3.1.3 Detection Wells

The groundwater quality results for the Semester I 2013 through Semester I 2015 reporting period were compared to Primary Drinking Water Standard (PDWS) MCLs, Secondary Drinking Water Standard (SDWS) MCLs, GCTLs, and background concentrations. The data indicate that the quality of groundwater generally meets established criteria. The results for parameters detected in detection wells at concentrations exceeding regulatory criteria are presented in **Table 3-1**. There were no exceedances of PDWS MCLs in any of the groundwater samples collected during the reporting period. Only iron was detected in concentrations that exceeded the SDWS MCL in samples from 4MW-21 and 4-MW-22. Values for pH were below the SDWS acceptable range in samples from 4MW-21.

Iron was detected in concentrations that exceeded the SDWS MCL in the sample collected from Floridan aquifer detection well 4MW-21 in March 2013 (336 ug/L) and in the sample collected from 4MW-22 in March 2015 (700 ug/L). The concentration of iron detected in the sample collected in March 2013 from well 4MW-21 was lower than the concentration detected in the August 2012 sample (808 ug/L). The concentration of iron detected in the sample collected from well 4MW-22 in March 2015 was the highest concentration detected since February 2010 (1,170 ug/L). The high concentration of iron in these samples may have been caused by elevated turbidity of the samples. Concentrations in samples from 4MW-21 and 4MW-22 are typically below the MCL.

Table 3-1. Parameters Detected in Detection Wells at Concentrations Exceeding Regulatory Criteria

Well	Aquifer	Parameter	Units	GCTL/ MCL	Average Background Concentration	Maximum Background Concentration	Minimum Background Concentration	DATE OF SAMPLE				
								March 2013	September 2013	March 2014	October 2014	March 2015
4MW-21	Floridan	Iron	ug/L	300	33.6	131	3.0 I	336	25.2	17.7	6.9	120
		pH	S.U.	6.5 - 8.5	7.48	7.78	7.16	6.31	5.93	6.93	6.40	7.17
4MW-22	Floridan	Iron	ug/L	300	33.6	131	3.0 I	84.4	15.2	6.4 I	5.0 I	700

NOTES:

Concentration exceeds the MCL/GCTL and maximum background concentration (or, in the case of pH, result is outside the acceptable range and above maximum or below minimum background)

Concentration exceeds the MCL/GCTL and the average background concentration (or, in the case of pH, result is outside the acceptable range and below average background)

Concentration exceeds the MCL/GCTL (or, in the case of pH, is outside the acceptable range)

MCL = Maximum Contaminant Level established in Chapter 62-550, F.A.C.

GCTL = Groundwater Cleanup Target Level established in Chapter 62-777, F.A.C.

S.U. = Standard Units

ug/L = Microgram per liter

I = Analyte detected below the quantitation limit

Values for pH were below the acceptable range in three of the five samples collected from detection well 4MW-21 during the Semester I 2013 through Semester I 2015 reporting period. Values for pH were below the acceptable range in all samples collected from this well prior to March 2014.

3.1.4 Trends and Correlations

Figures B-1 through B-21 (Appendix B) are time versus concentration graphs for parameters that were consistently detected in groundwater samples collected during the Semester I 2013 through Semester I 2015 reporting period. The data indicate that the quality of groundwater is stable and has not been adversely impacted by the Class III landfill.

There are few trends and correlations. The concentrations of iron in samples from wells 4MW-21 and 4MW-22 correlate with turbidity values. Values for pH have generally increased in samples collected from well 4MW-21. Concentrations of other analytes changed little over the monitoring period or did not exhibit significant correlations with other parameters.

3.2 Leachate Quality

3.2.1 Leachate Data

Until the permit was renewed in November 2013, leachate sampling and analysis was required to be conducted annually from Tanks 1 and 2 in accordance with Specific Condition E.9.b of the former permit. Leachate sampling was performed in February 2013 and October 2013. **Table B-2** (Appendix B) is a summary of field parameters and analytes detected in leachate samples.

3.2.2 Leachate Quality

The leachate quality results of the samples collected during the Semester I 2013 through Semester I 2015 reporting period were compared to toxicity characteristic criteria in Table 1 of 40 CFR Part 261.24. None of the analytes in any of the leachate samples exceeded the criteria for the toxicity characteristic listed in Table 1 of 40 CFR Part 261.24.

Section 4
Conclusions and Recommendations

4.1 Conclusions

The following conclusions are based on evaluation of the data presented in this WQMPER:

- All of the monitor wells screened in sediments, which if saturated, would comprise the surficial aquifer (2MW-3A, 2MW-7, 2MW-8, 2MW-9, and 2MW-10) have been dry since 1995. These data indicate that there is no surficial aquifer beneath the Class III landfill.
- There were seasonal variations in the water levels in 2013 and 2014, and higher than expected water levels in the first semester of 2015. The high groundwater levels in March 2015 are attributed to abnormally high rainfall in early 2015.
- The direction of the groundwater water movement in the Floridan aquifer beneath the Class III landfill is generally from southwest to northeast beneath the westernmost cell and generally from southeast to northwest beneath the eastern three cells. Overall, the gradient is generally to the north.
- The average hydraulic gradient for the Floridan aquifer during the monitoring period was 0.0023. The calculated average rate of groundwater movement in the Floridan aquifer beneath the Class III landfill is 0.14 foot/day or approximately 4.26 feet/month.
- No parameters were detected above MCLs or GCTLs in samples collected from the Floridan aquifer background well 4MW-7, and the pH values were within the acceptable range.
- There were no exceedances of PDWS criteria in any of the groundwater samples collected from any of the detection wells during the reporting period.
- Iron was detected in concentrations that exceeded the SDWS MCL in the sample collected from Floridan aquifer detection well 4MW-21 in March 2013 and in the sample collected from Floridan aquifer detection well 4MW-22 in March 2015. Concentrations of iron in samples from 4MW-21 and 4MW-22 are typically below the MCL.
- The concentrations of iron in samples from wells 4MW-21 and 4MW-22 correlate with turbidity values. The high concentration of iron in the samples collected from well 4MW-21 in March 2013 and well 4MW-22 in March 2015 may have been caused by elevated turbidity in the samples.
- Values for pH were below the acceptable range in three of the five samples collected from detection well 4MW-21 during the Semester I 2013 through Semester I 2015 reporting period. Values for pH were below the acceptable range in all samples collected from this well prior to March 2014.

- The groundwater quality data indicate that the quality of groundwater is stable and has not been adversely impacted by the Class III landfill.
- None of the analytes in any of the leachate samples exceeded the maximum concentrations for the toxicity characteristic listed in Table 1 of 40 CFR Part 261.24.
- The groundwater monitoring program is sufficient to detect a release of contaminants into groundwater.

4.2 Recommendations

Monitoring should continue in accordance with the March 2013 WQMP.

Appendix A

Groundwater Level Elevation Table, Hydrographs and Groundwater Contour Maps

Groundwater Elevation Table

Table A-1. Water Level Elevations From All Monitor Wells and Piezometers From March 2013 To March 2015

Monitor Well	Water Level Elevations (FT NGVD*)				
	2013		2014		2015
	3/4/13	8/27/13	3/25/14	10/1/14	3/2/15
2MW-3A	DRY	DRY	DRY	DRY	DRY
2MW-7	DRY	DRY	DRY	DRY	DRY
2MW-8	DRY	DRY	DRY	DRY	DRY
2MW-9	DRY	DRY	DRY	DRY	DRY
2MW-10	DRY	DRY	DRY	DRY	DRY
4MW-3A	29.28†	28.09	26.19	28.44	26.21
4MW-7	28.40	30.24	28.39	30.82	30.16
4MW-8	28.22	30.19	28.30	30.94	31.06
4MW-9	27.13	28.71	26.81	29.23	29.7
4MW-21	25.98†	29.86	28.11	30.78	30.88
4MW-22	24.80	28.60	26.88	29.25	29.67
Hydraulic Gradient	Not Calculated‡	0.0017	0.0018	0.0020	0.0037

Note:

Hydraulic gradient estimated using a three-point solution with water level elevations from monitor wells 4MW-7, 4MW-8, and 4MW-3A

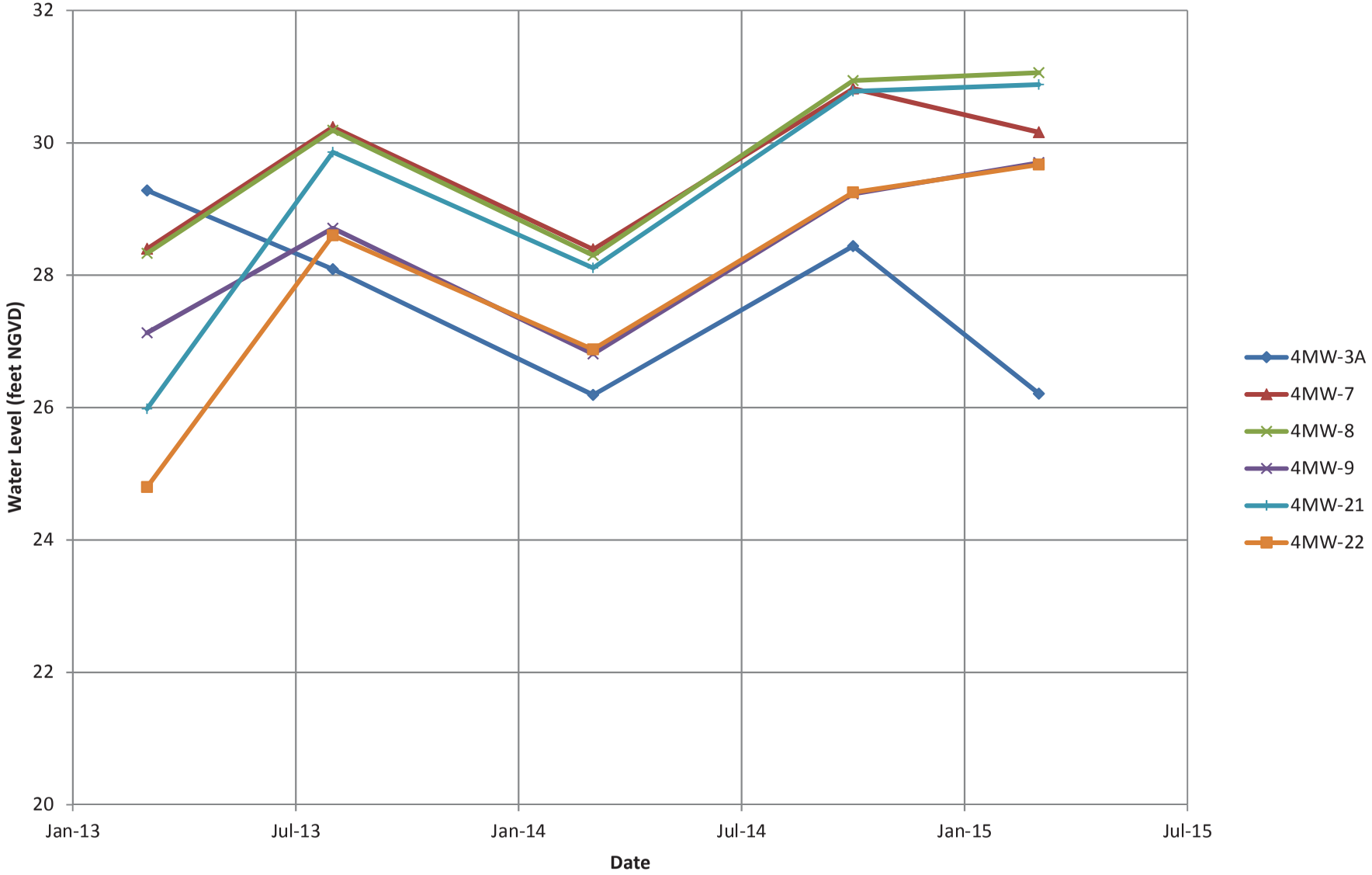
* National Geodetic Vertical Datum of 1929 (NGVD 29)

† Water level elevation is considered anomalus

‡ A hydraulic gradient was not calculated for 3/4/13 because at least two of the water level elevations are anomolus

Hydrographs

Figure A-1 Hydrographs of Floridan Aquifer Monitor Wells and Piezometers



CDM Smith

Groundwater Contour Maps

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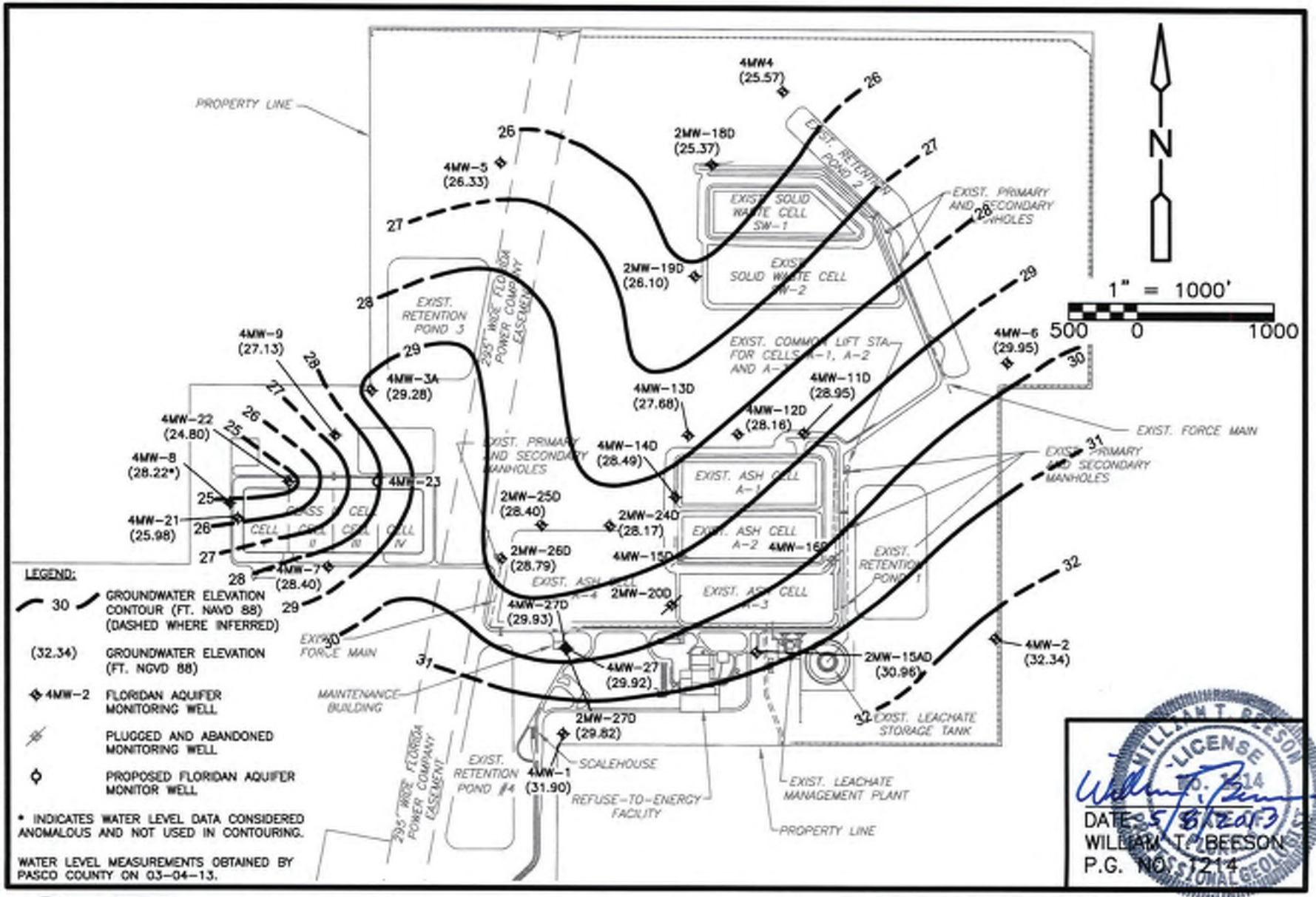
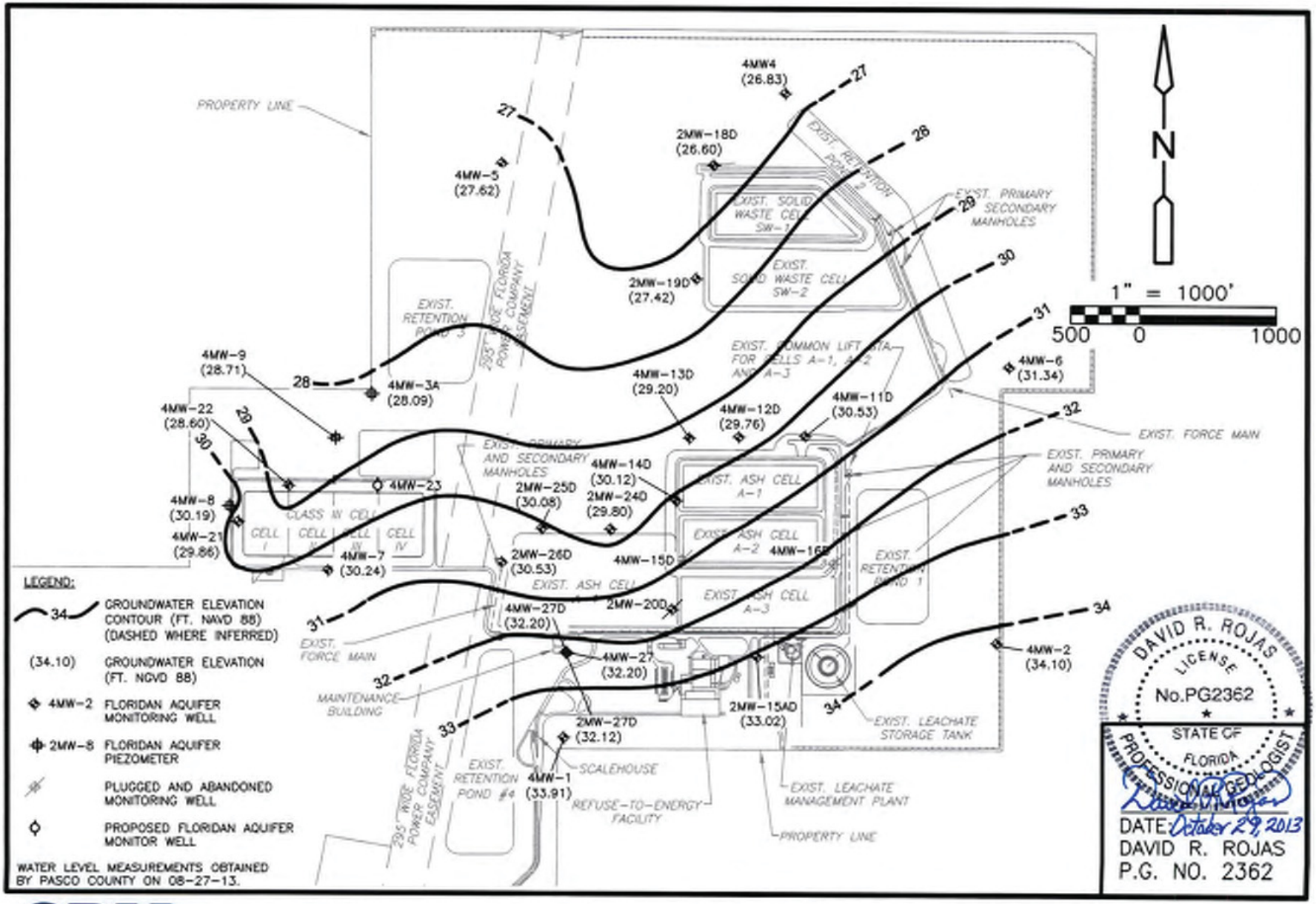


CDM Smith

Potentiometric Surface of Floridan Aquifer, 1st Quarter 2013
West Pasco Resource Recovery Facility
Spring Hill, Pasco County, Florida



CDM Smith

Potentiometric Surface of Floridan Aquifer, 3rd Quarter, 2013
West Pasco Resource Recovery Facility
Spring Hill, Pasco County, Florida

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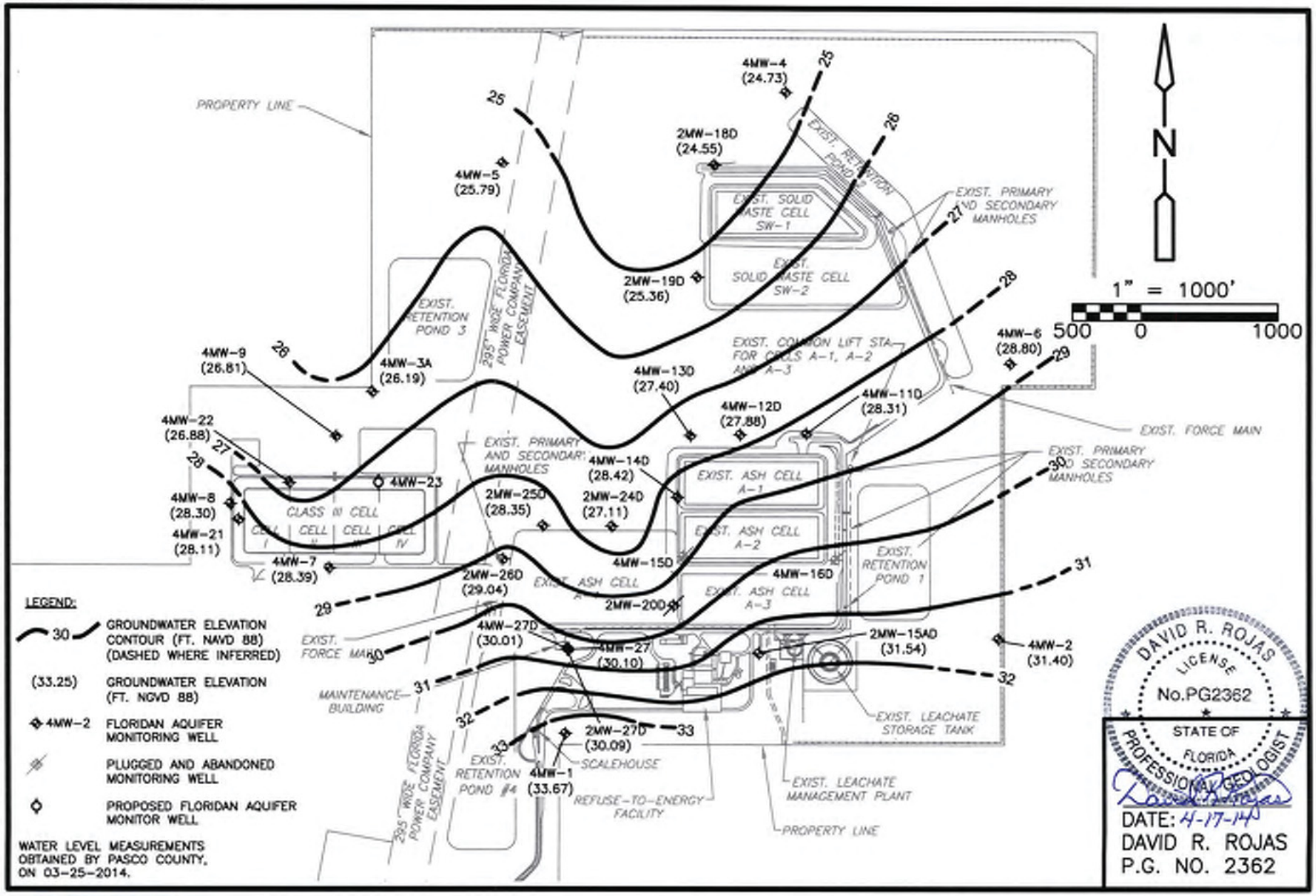

CDM Smith

Potentiometric Surface of Floridan Aquifer, 1st Quarter 2014
West Pasco Resource Recovery Facility
Spring Hill, Pasco County, Florida

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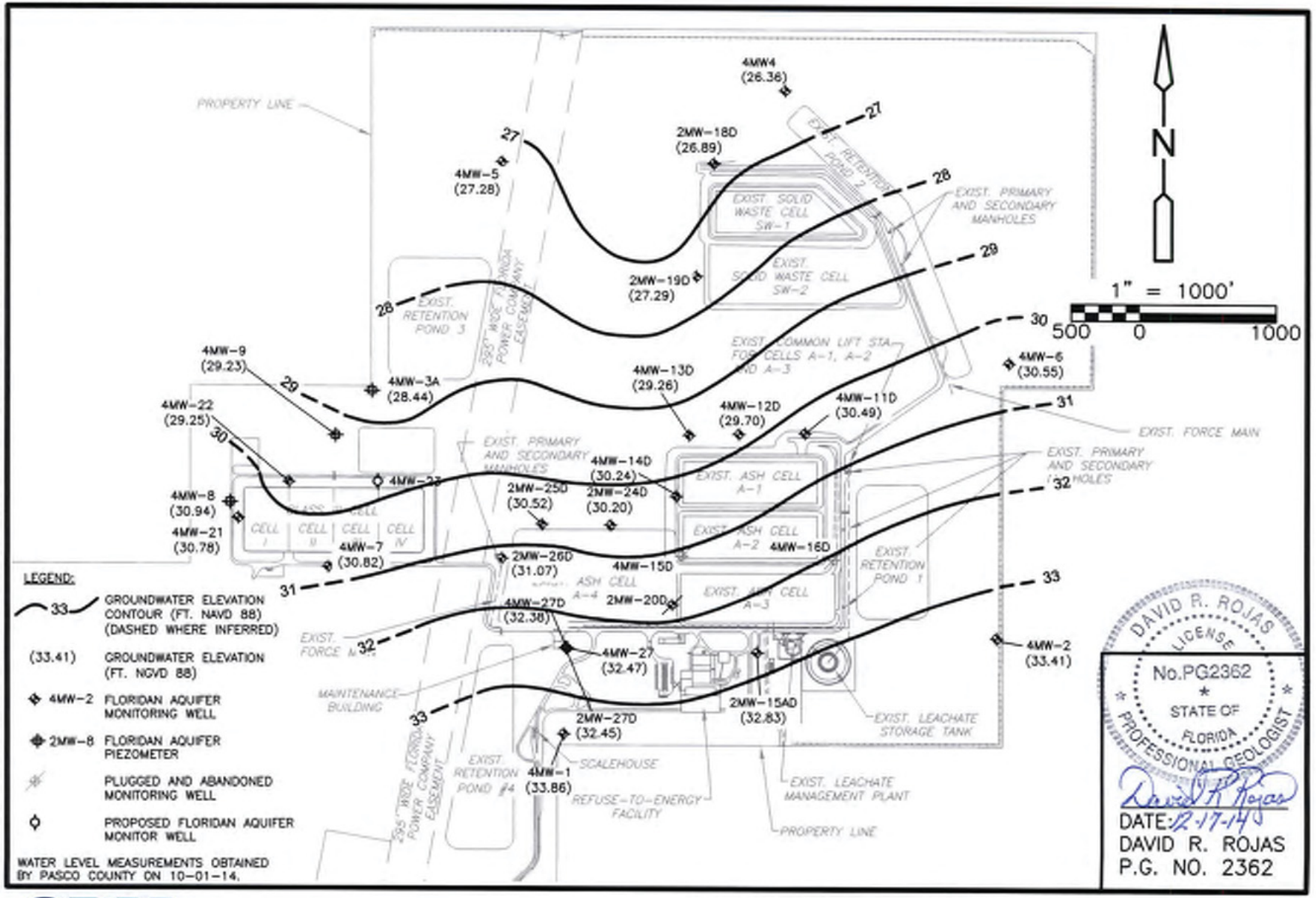

CDM Smith

Potentiometric Surface of Floridan Aquifer, 4th Quarter, 2014
West Pasco Resource Recovery Facility
Spring Hill, Pasco County, Florida

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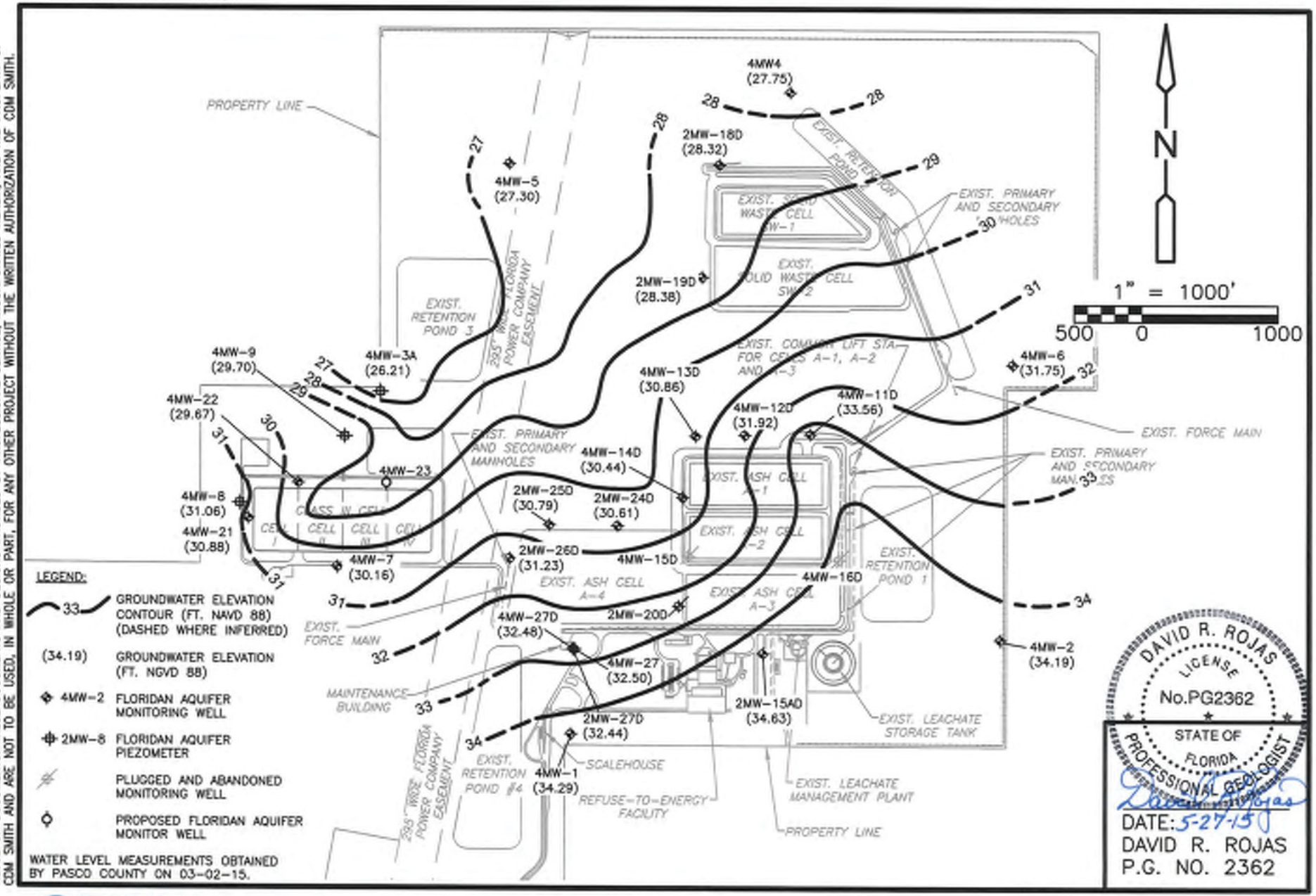


CDM Smith

Potentiometric Surface of Floridan Aquifer, 1st Quarter, 2015
West Pasco Resource Recovery Facility
Spring Hill, Pasco County, Florida

Appendix B

Summary of Groundwater Results, Parameter vs. Time Graphs for Groundwater Data, and Summary of Leachate Results

Summary of Groundwater Results

Table B-1. Analyte Detections in Monitor Wells for West Pasco Class III Landfill from March 2013 to March 2015

Well No.	Well Designation	Parameter	Units	GCTL/MCL	Mar-13	Sep-13	Mar-14	Oct-14	Mar-15
4MW-7	Background	Antimony	ug/l	6	0.079 I				
4MW-7	Background	Barium	ug/l	2000	9.4	11	11	9.9	9.2
4MW-7	Background	Cadmium	ug/l	5		0.74			
4MW-7	Background	Chloride	mg/l	250	16.7	12	14	13.5	13.7
4MW-7	Background	Chloroform	ug/l				0.3 I		
4MW-7	Background	Chromium	ug/l	100	0.37 I		4.2 I		
4MW-7	Background	Copper	ug/l	1000	0.29 I	0.23 I	0.63	0.29 I	0.3 I
4MW-7	Background	Dissolved Oxygen	mg/l		1.03	1.27	1.11	0.98	0.95
4MW-7	Background	Iron	ug/l	300	3.4 I	131	3 I	20.7	
4MW-7	Background	Mercury	ug/l	2	0.04 I		0.08 I		
4MW-7	Background	Nickel	ug/l	100	2.2 I	3.4 I	2.6 I	3.3 I	3.3 I
4MW-7	Background	Nitrate (N)	mg/l	10		0.09	0.34	0.57	0.17
4MW-7	Background	pH	SU	6.5 - 8.5	7.16	7.29	7.48	7.78	7.69
4MW-7	Background	Residues- Filterable (TDS)	mg/l	500	194	216	198	220	224
4MW-7	Background	Sodium	mg/l	160	7.84	5.14	4.81	4.75	5.3
4MW-7	Background	Specific Conductance	µmhos/cm		336	328	339	432	300
4MW-7	Background	Temperature	°C		21.83	26.19	21.25	24.14	23.95
4MW-7	Background	Turbidity	NTU		7.4	2.9	0.0	0.0	0.0
4MW-7	Background	Vanadium	ug/l	49	7.9 I				
4MW-7	Background	Zinc	ug/l	5000			1 I		
4MW-21	Detection	Acetone	ug/l	6,300	850		2.4 I		
4MW-21	Detection	Ammonia (N)	mg/l	2.8	0.02 I				
4MW-21	Detection	Antimony	ug/l	6		0.14 I			
4MW-21	Detection	Arsenic	ug/l	10		1.1 I			
4MW-21	Detection	Barium	ug/l	2000	10	9.5	9.9	8.7	9.5
4MW-21	Detection	Beryllium	ug/l	4	0.25 I	0.26 I	0.35 I	0.17 I	
4MW-21	Detection	Cadmium	ug/l	5	1.4	1.6	1.6	2.0	1.0
4MW-21	Detection	Chloride	mg/l	250	15.0	11.0	14.0	12.5	11.6
4MW-21	Detection	Chromium	ug/l	100	1.2 I		2.7 I		0.83 I
4MW-21	Detection	Copper	ug/l	1000	0.56	0.17 I	0.33 I	0.63	1.6
4MW-21	Detection	Dissolved Oxygen	mg/l		2.45	3.63	2.23	3.11	2.24
4MW-21	Detection	Iron	ug/l	300	336	25.2	17.7	6.9 I	120
4MW-21	Detection	Lead	ug/l	15	0.52				0.94
4MW-21	Detection	Mercury	ug/l	2	0.09 I				0.17 I
4MW-21	Detection	Nickel	ug/l	100	2.3 I	1.9 I	1.9 I	2.0 I	2.5 I
4MW-21	Detection	Nitrate (N)	mg/l	10	8.05	8.35	8.35	7.32	6.8
4MW-21	Detection	pH	SU	6.5 - 8.5	6.31	5.93	6.93	6.40	7.17
4MW-21	Detection	Residues- Filterable (TDS)	mg/l	500	134	142	134	114	156
4MW-21	Detection	Sodium	mg/l	160	6.72	7.00	6.53	5.61	7.1
4MW-21	Detection	Specific Conductance	µmhos/cm		168	452	148	171	129
4MW-21	Detection	Temperature	°C		21.30	27.46	23.39	25.16	24.65
4MW-21	Detection	Turbidity	NTU		10.2	6.0	1.5	0.0	14.8
4MW-21	Detection	Vanadium	ug/l	49	8.8 I				
4MW-21	Detection	Zinc	ug/l	5000	2.9 I	2.8 I	13	7.1	7.6
4MW-22	Detection	Acetone	ug/l	6,300		2.3 I			
4MW-22	Detection	Ammonia (N)	mg/l	2.8	0.022 I				
4MW-22	Detection	Antimony	ug/l	6		0.13 I			
4MW-22	Detection	Arsenic	ug/l	10	1.6 I	1.8 I			2.2 I
4MW-22	Detection	Barium	ug/l	2000	11	12	11	9.5	13.0
4MW-22	Detection	Chloride	mg/l	250	22.3	22.0	21.7	21.6	19.2
4MW-22	Detection	Chromium	ug/l	100	0.66 I	1.9 I	5.5		
4MW-22	Detection	Copper	ug/l	1000	0.25 I	0.33 I	0.53	1	0.54
4MW-22	Detection	Dissolved Oxygen	mg/l		1.12	1.18	1.13	1.05	1.11
4MW-22	Detection	Iron	ug/l	300	84.8	15.2	6.4 I	5.0 I	700.0
4MW-22	Detection	Mercury	ug/l	2	1.26				
4MW-22	Detection	Nickel	ug/l	100	3.2 I	2.7 I	2.8 I	3.2 I	4.8 I
4MW-22	Detection	Nitrate (N)	mg/l	10		1.34	0.21	0.20	0.09 I
4MW-22	Detection	pH	SU	6.5 - 8.5	7.15	7.09	7.91	8.06	7.84
4MW-22	Detection	Residues- Filterable (TDS)	mg/l	500	258	276	254	244	290
4MW-22	Detection	Selenium	ug/l	50	1.1 I				
4MW-22	Detection	Sodium	mg/l	160	6.51	6.47	6.41	7.13	7.1
4MW-22	Detection	Specific Conductance	µmhos/cm		412	404	406	441	388
4MW-22	Detection	Temperature	°C		21.45	28.43	23.24	25.39	24.05
4MW-22	Detection	Turbidity	NTU		0.0	1.4	0.0	0.0	14.7
4MW-22	Detection	Zinc	ug/l	5000			1.1 I	2.8 I	

NOTES:

GCTL - Groundwater Cleanup Target level (Chapter 62-777, F.A.C.)

MCL - Maximum Contaminant Target Level (Chapter 62-550, F.A.C.)

mg/l - milligrams per liter

ug/L - micrograms per liter

NTU - nephelometric turbidity units

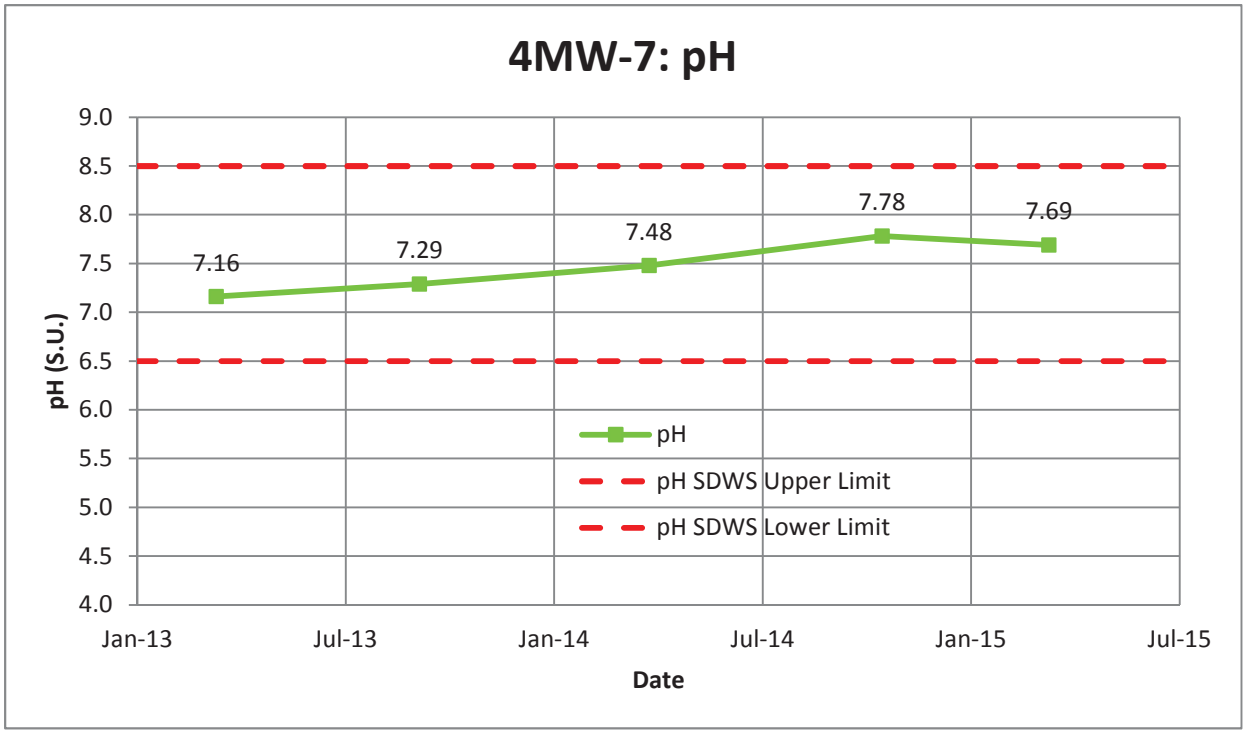
°C - degrees Centigrade

I - analyte detected below the quantitation limit

SU - Standard Unit

µmhos/cm - micromohs per centimeter

Parameter vs. Time Graphs for Groundwater Data



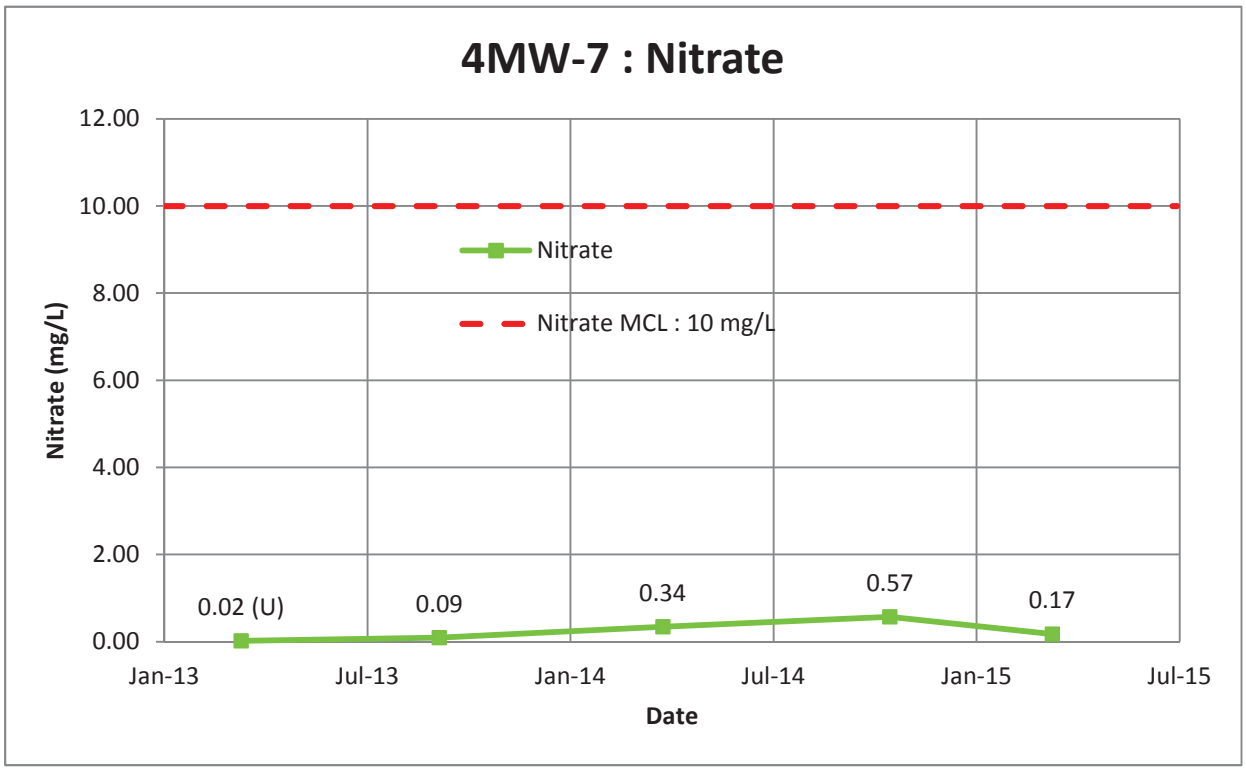
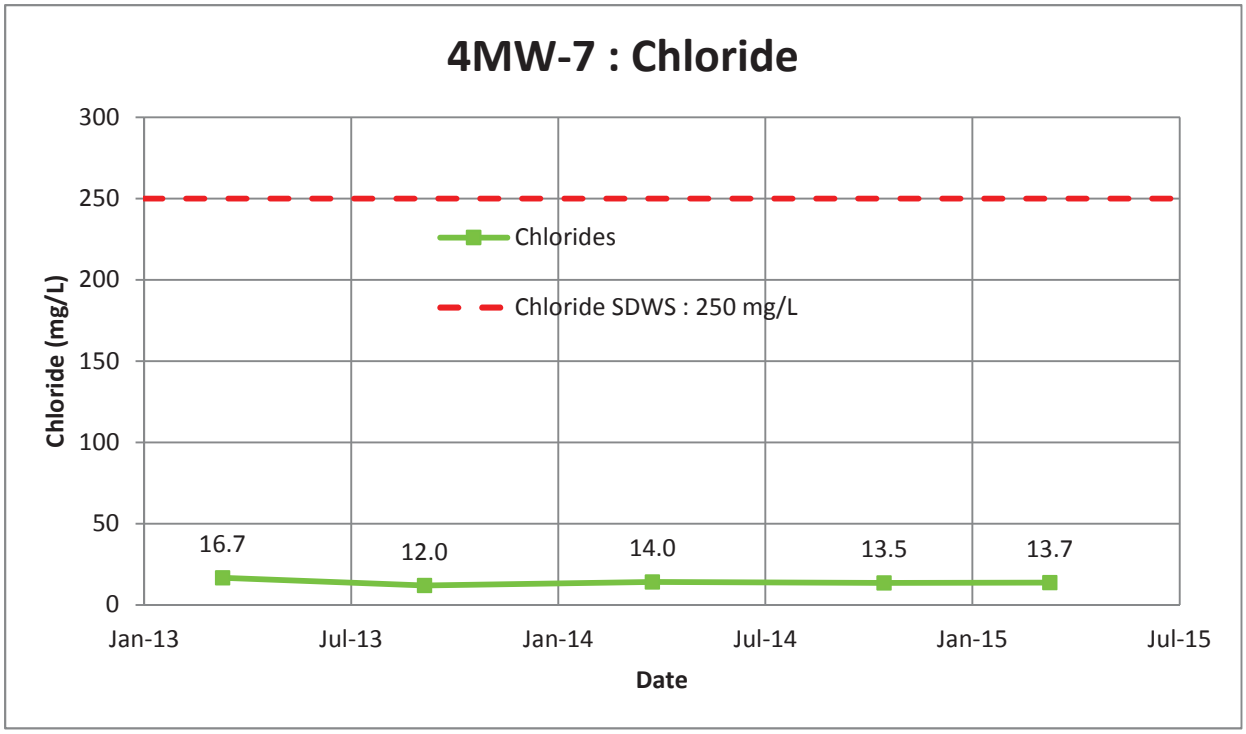


Figure B-1 pH and Nitrate Trends for 4MW-7

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



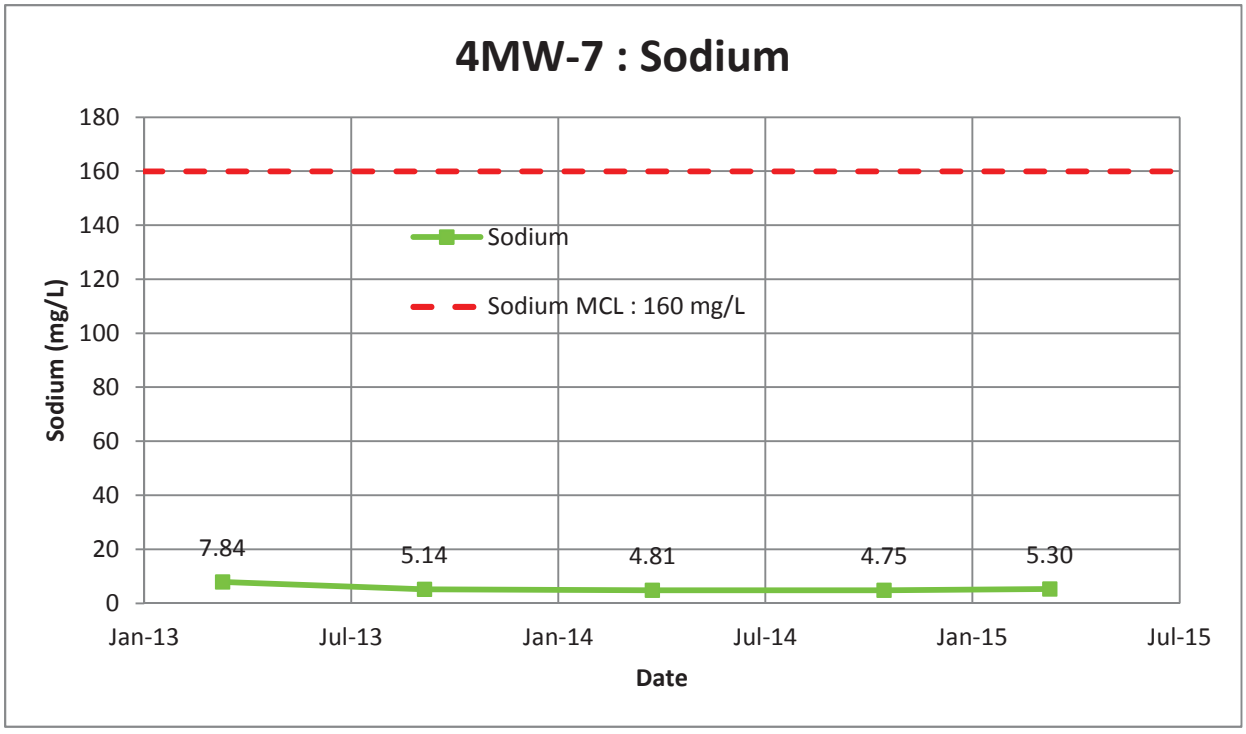
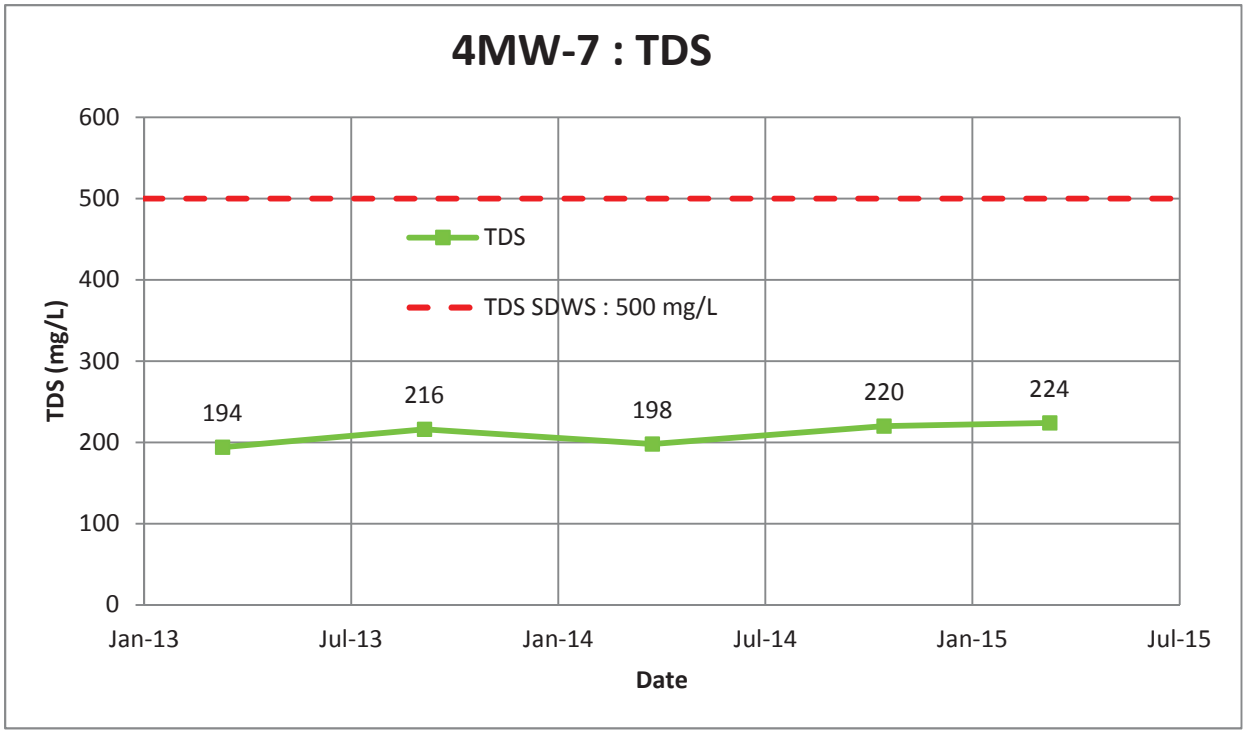


Figure B-2 Chloride and Sodium Trends for 4MW-7

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



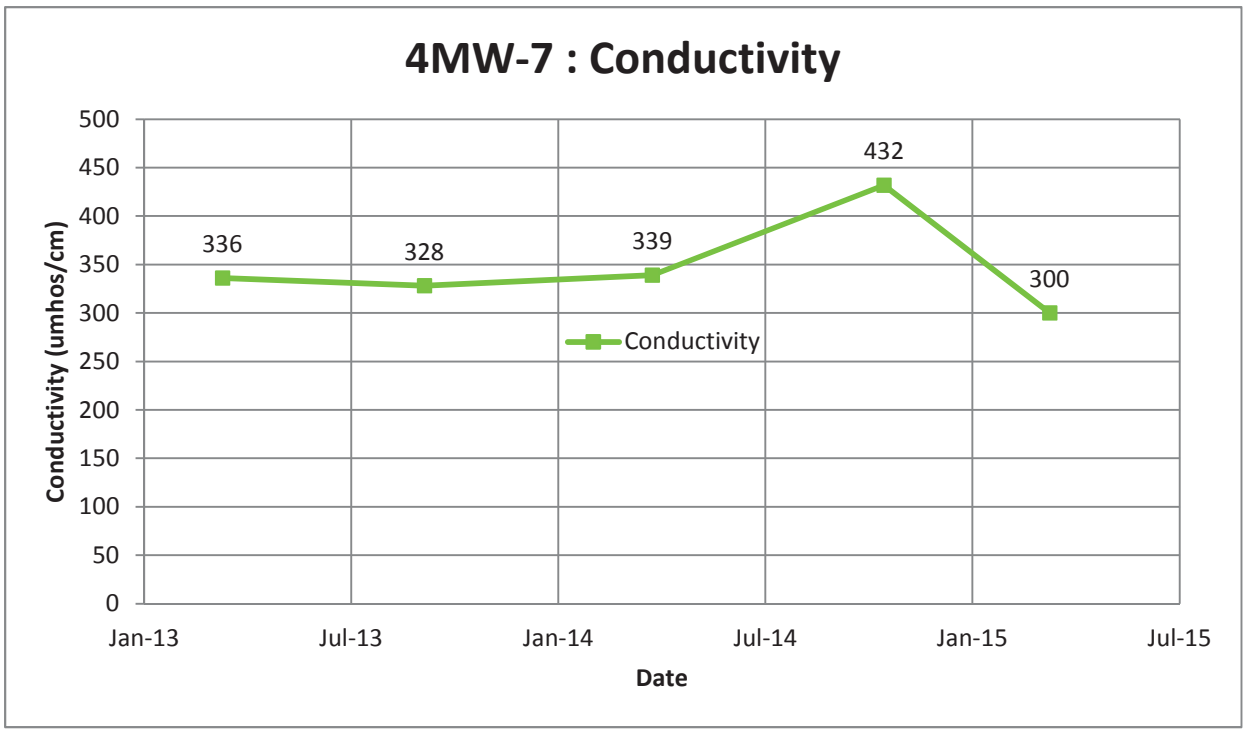
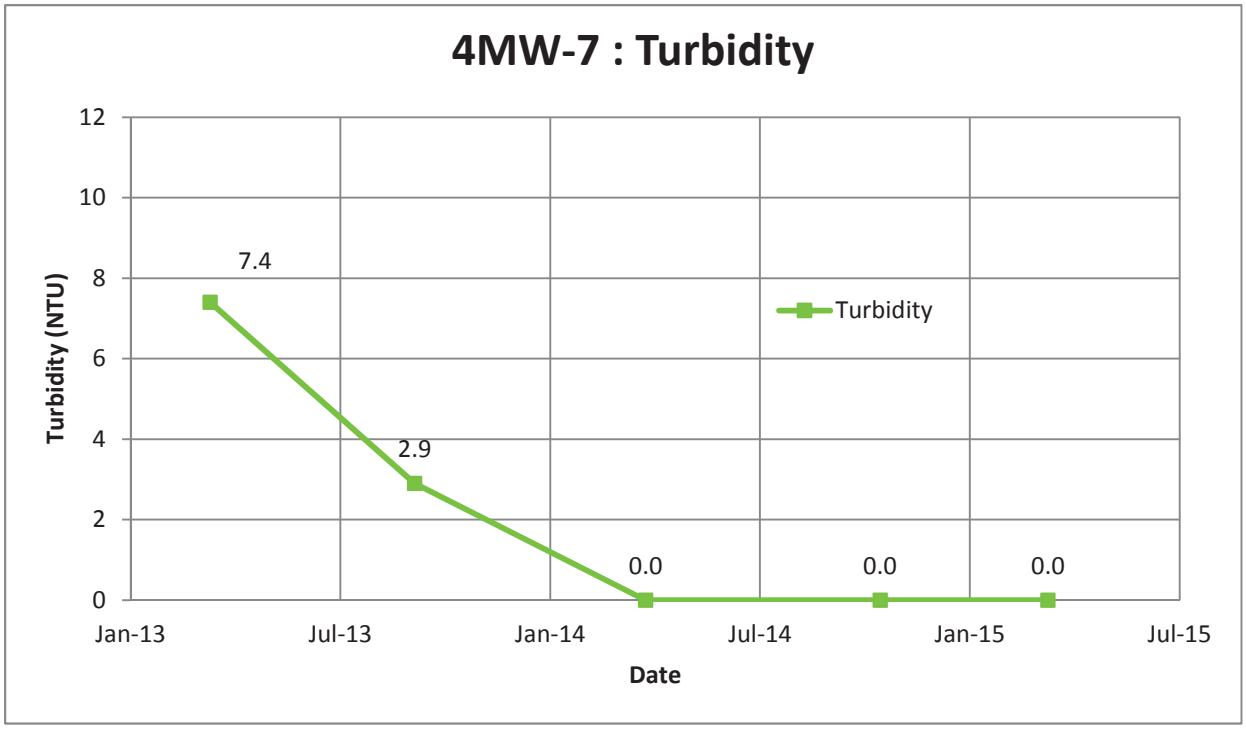


Figure B-3 TDS and Conductivity Trends for 4MW-7

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



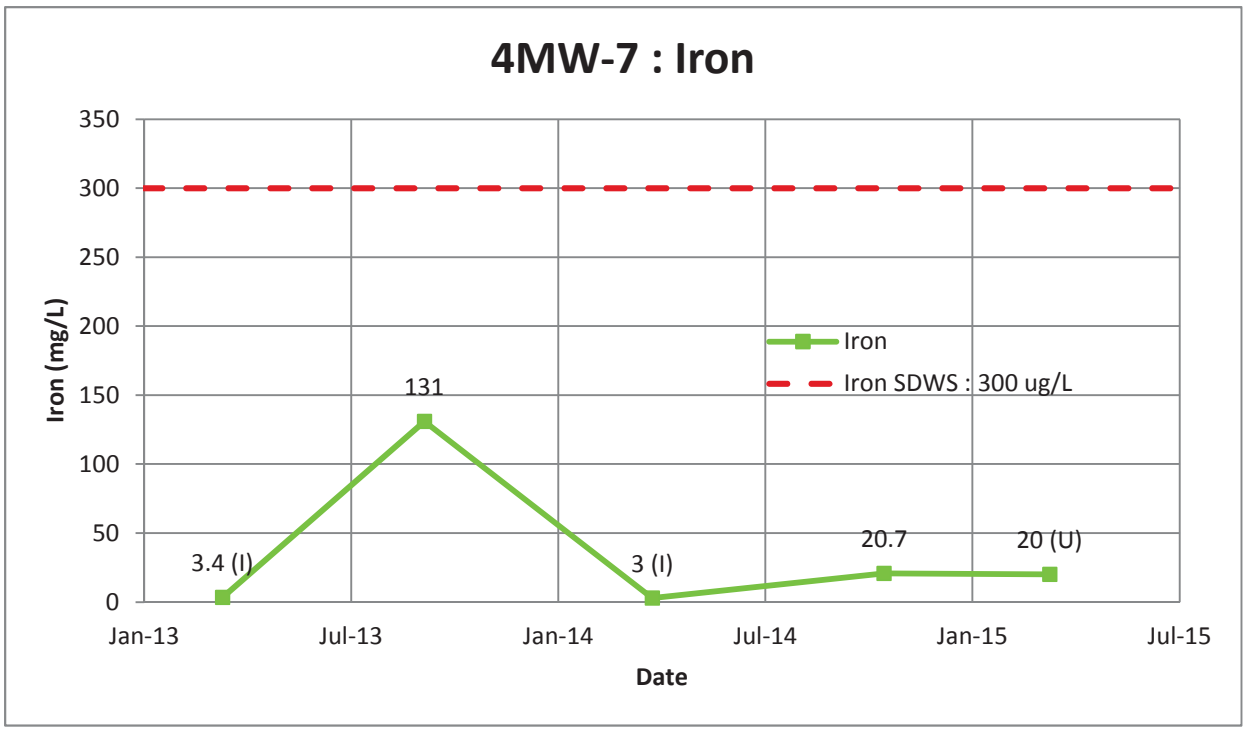
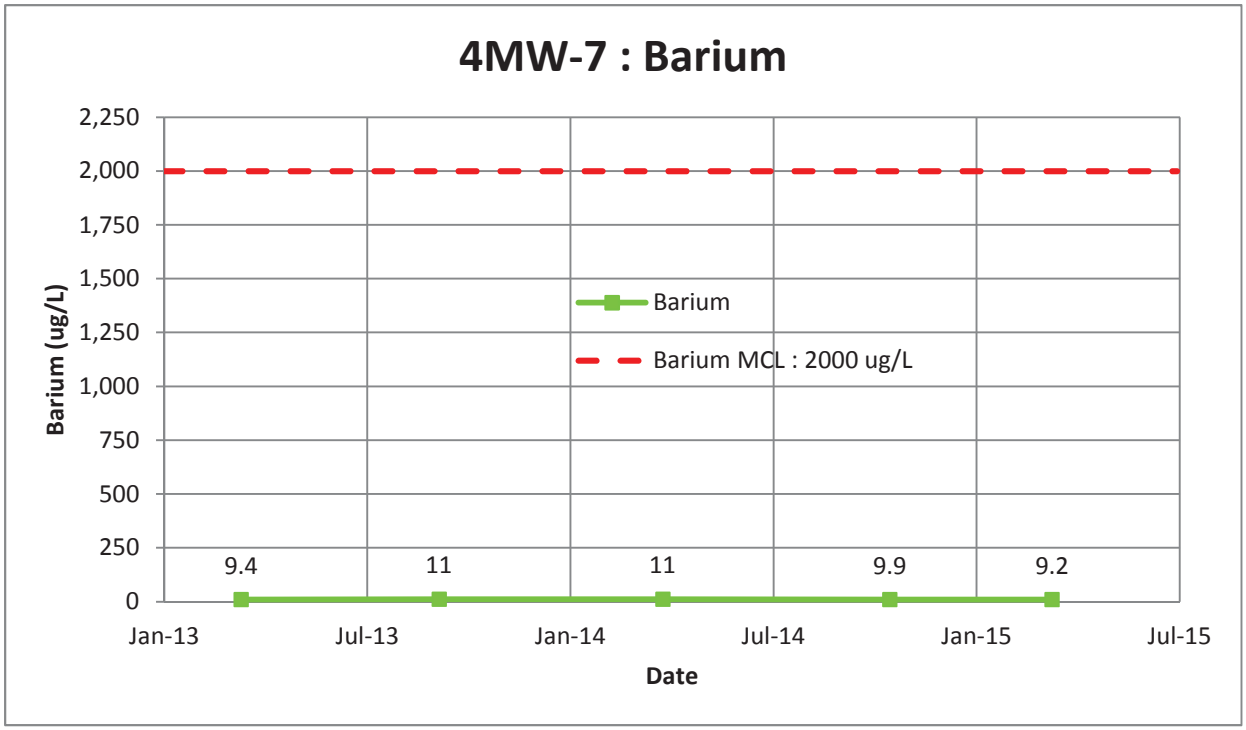


Figure B-4 Turbidity and Iron Trends for 4MW-7

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



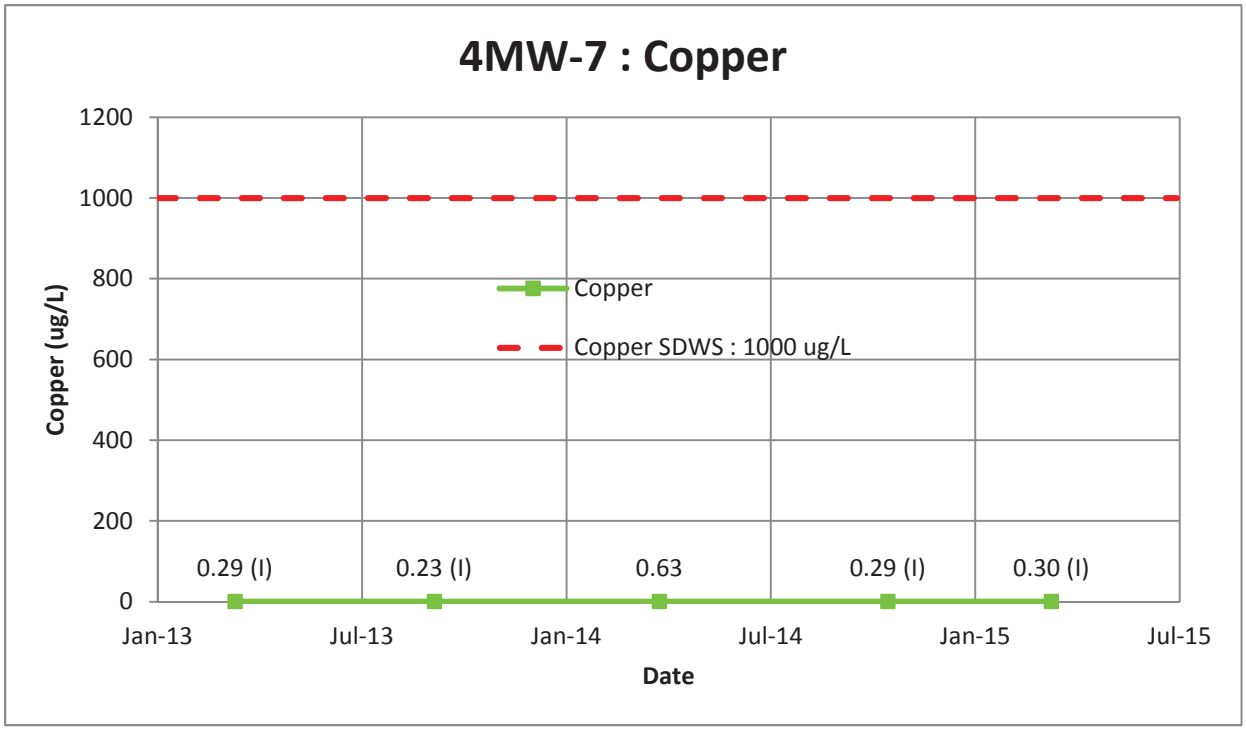


Figure B-5 Barium and Copper Trends for 4MW-7

MCL - Maximum Contaminant Level per 62-550 F.A.C

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab

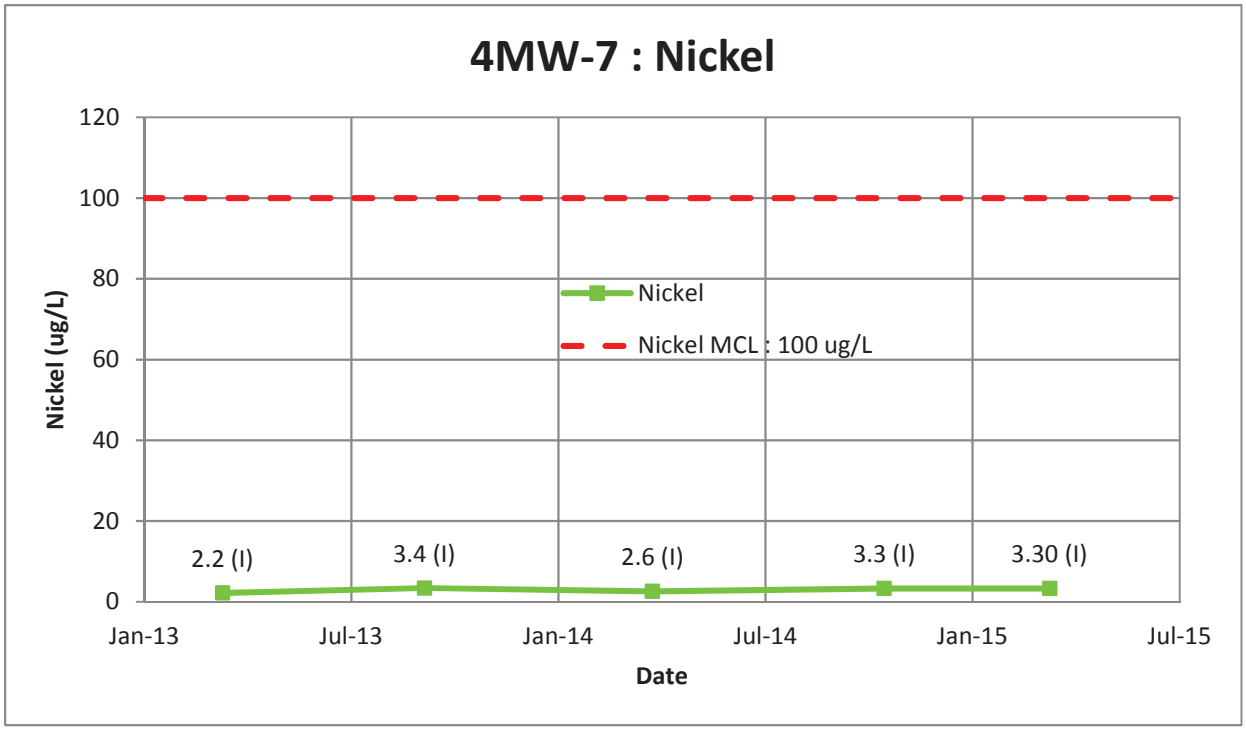
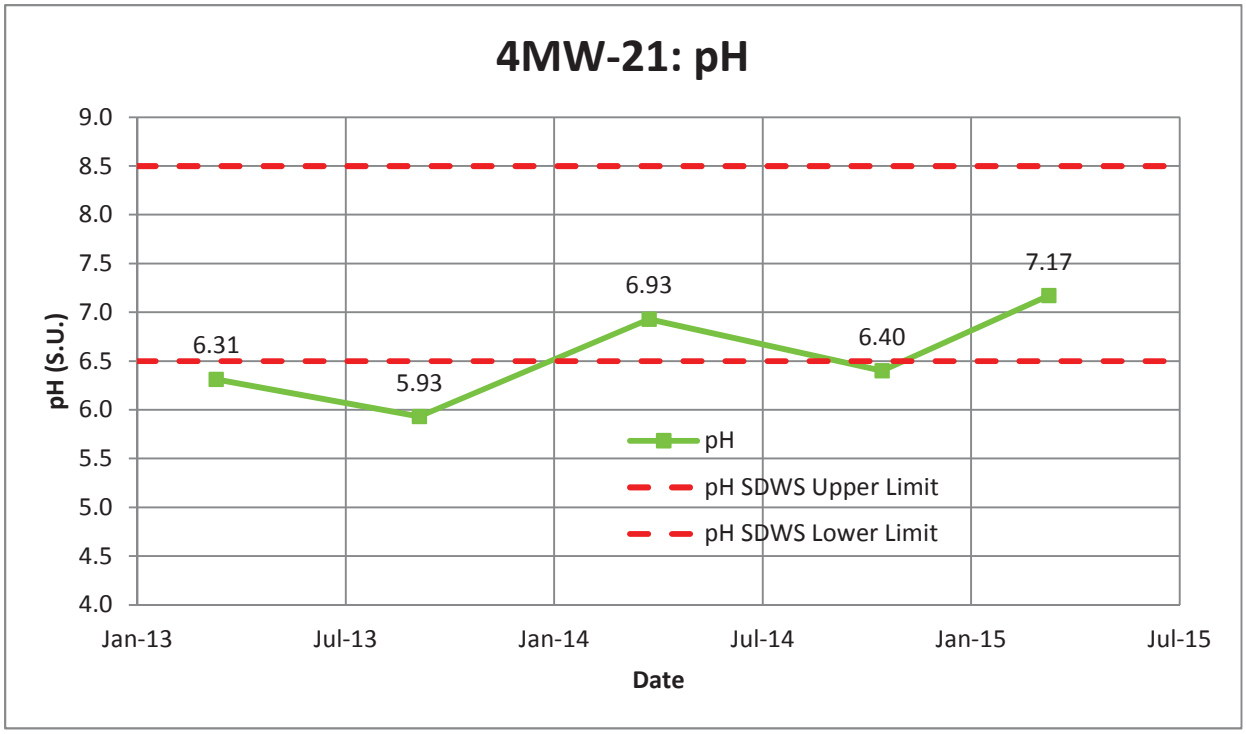


Figure B-6 Nickel Trend for 4MW-7

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



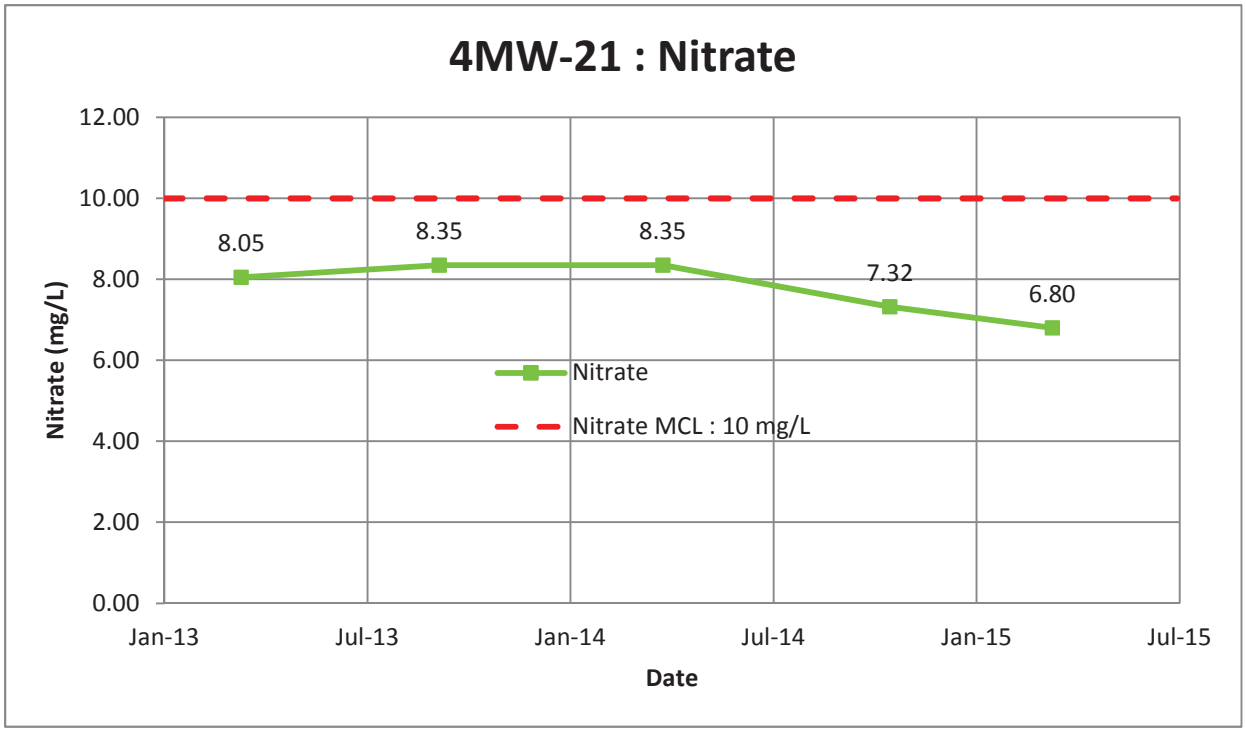
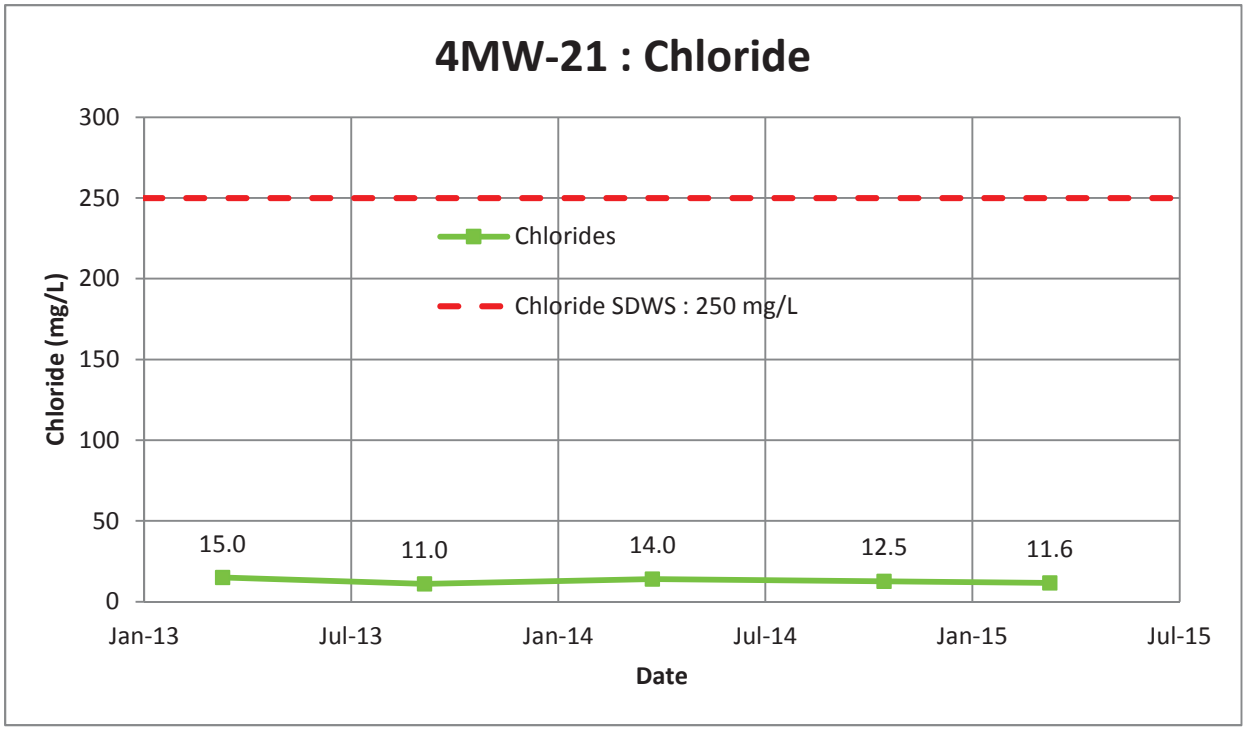


Figure B-7 pH and Nitrate Trends for 4MW-21

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



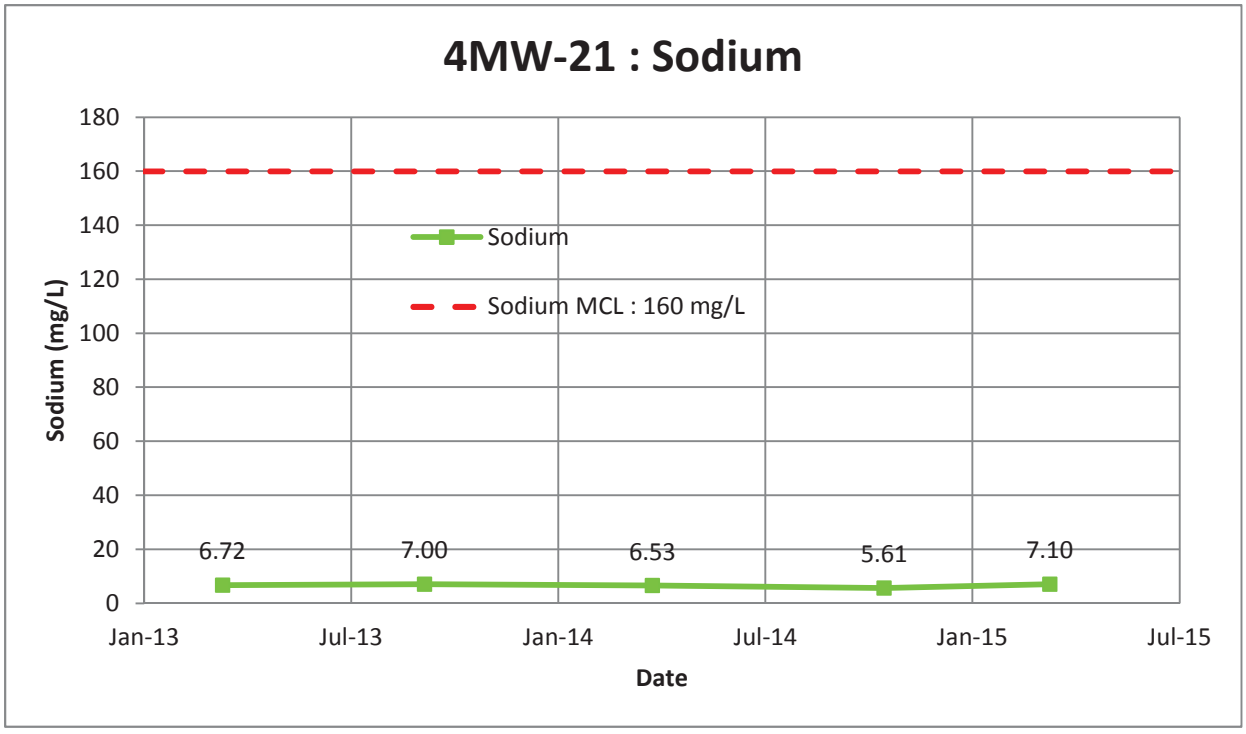
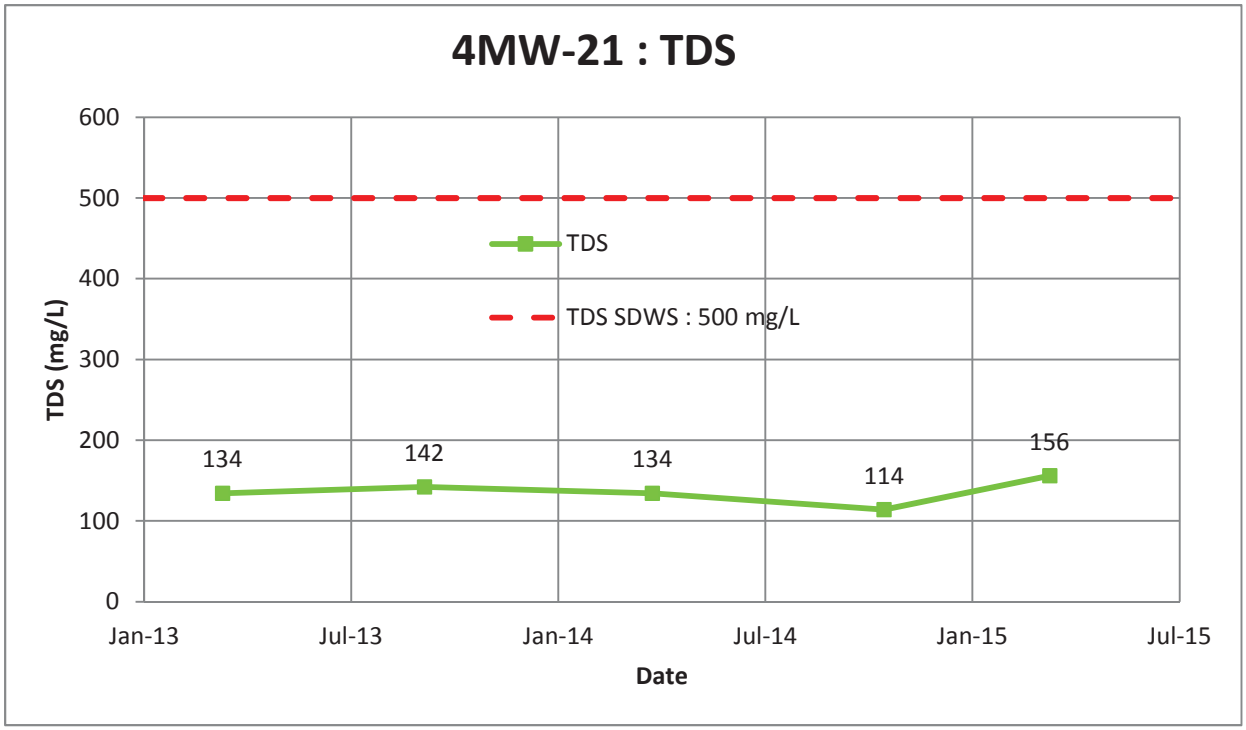


Figure B-8 Chloride and Sodium Trends for 4MW-21

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



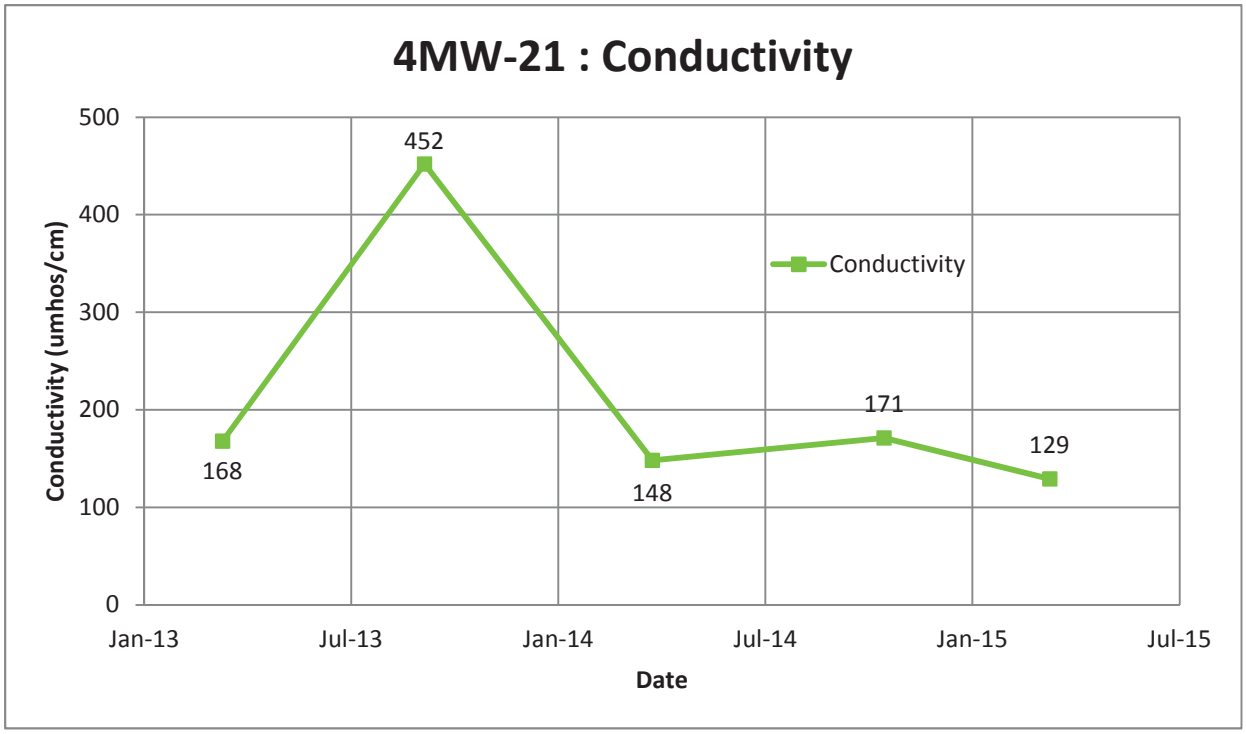
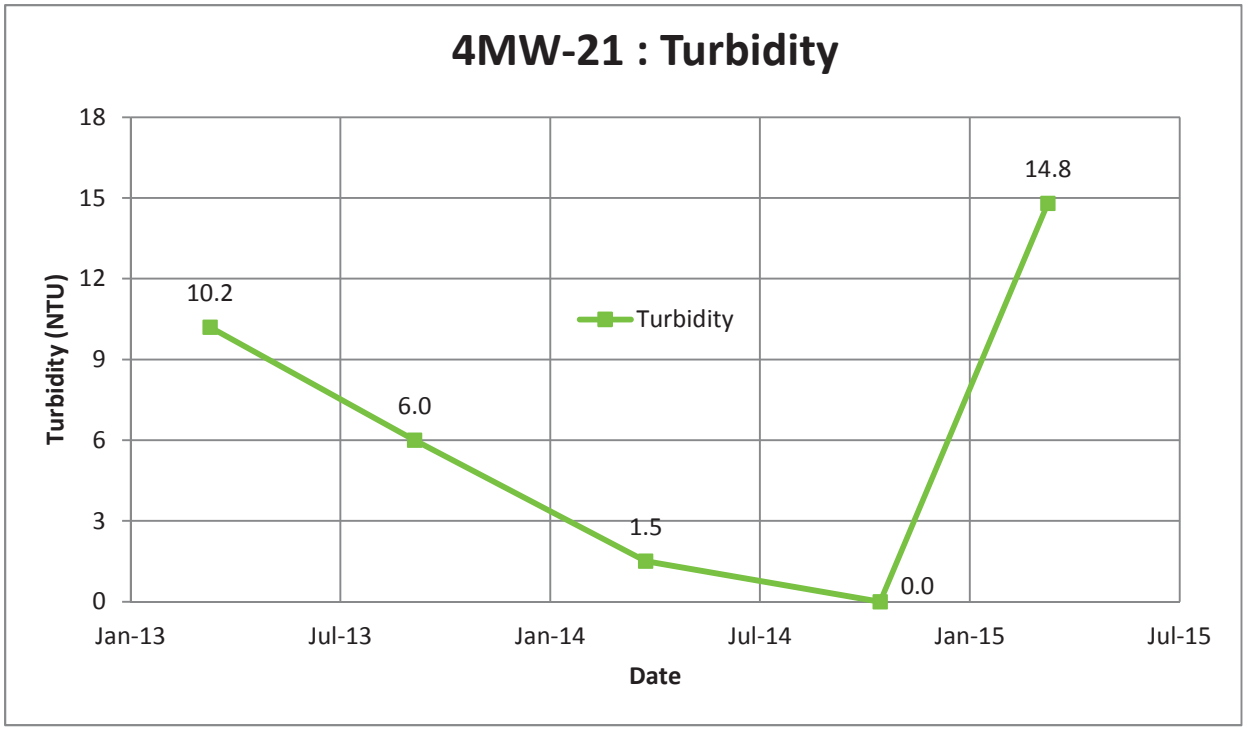


Figure B-9 TDS and Conductivity Trends for 4MW-21

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



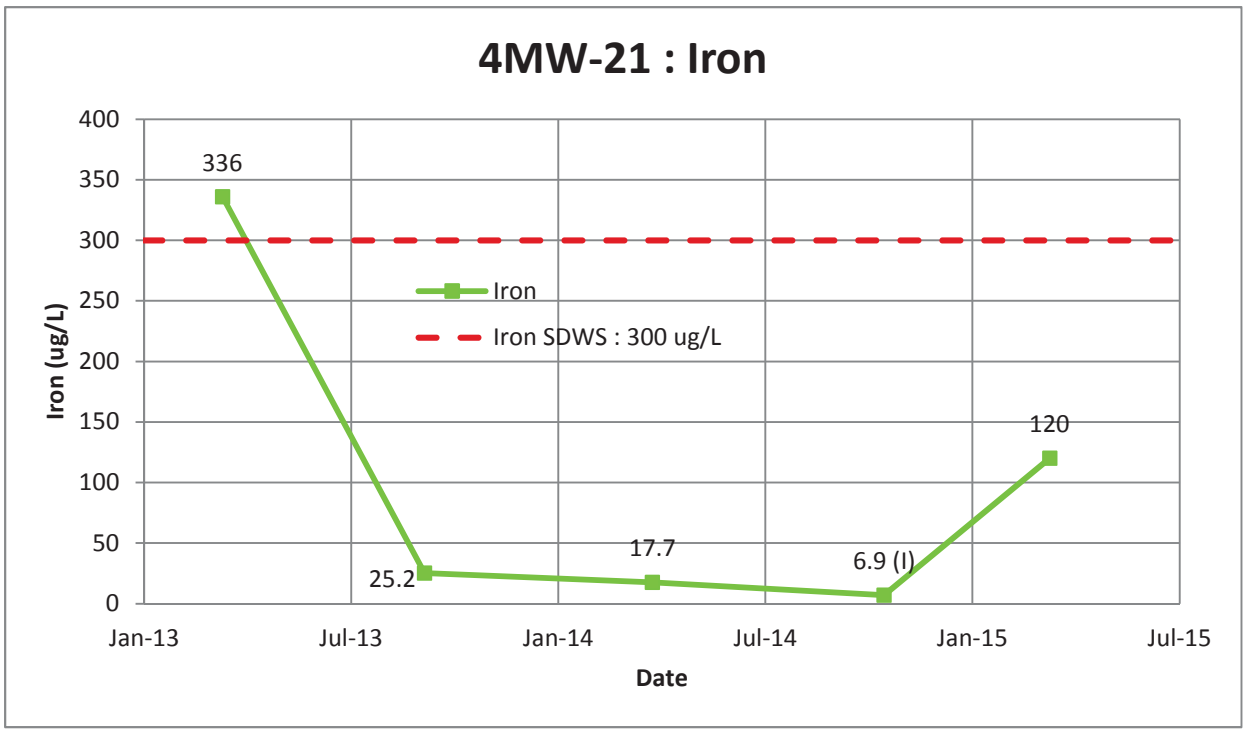
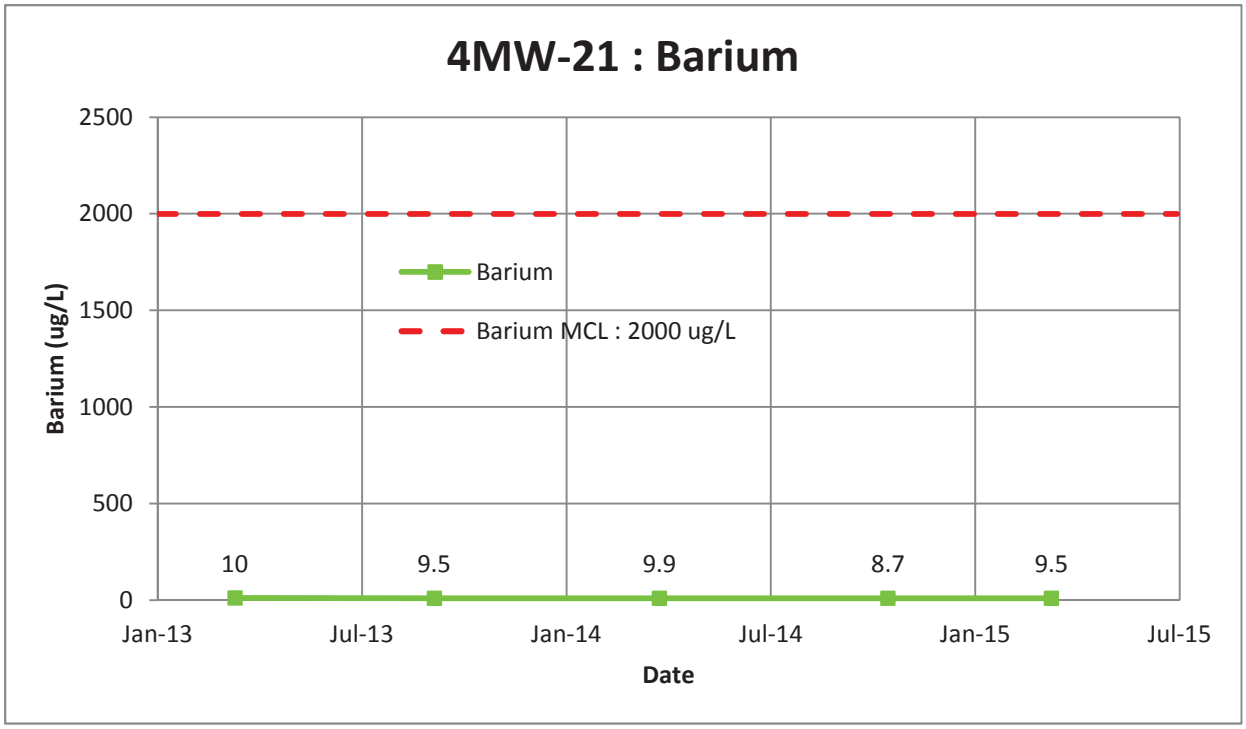


Figure B-10 Turbidity and Iron Trends for 4MW-21

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



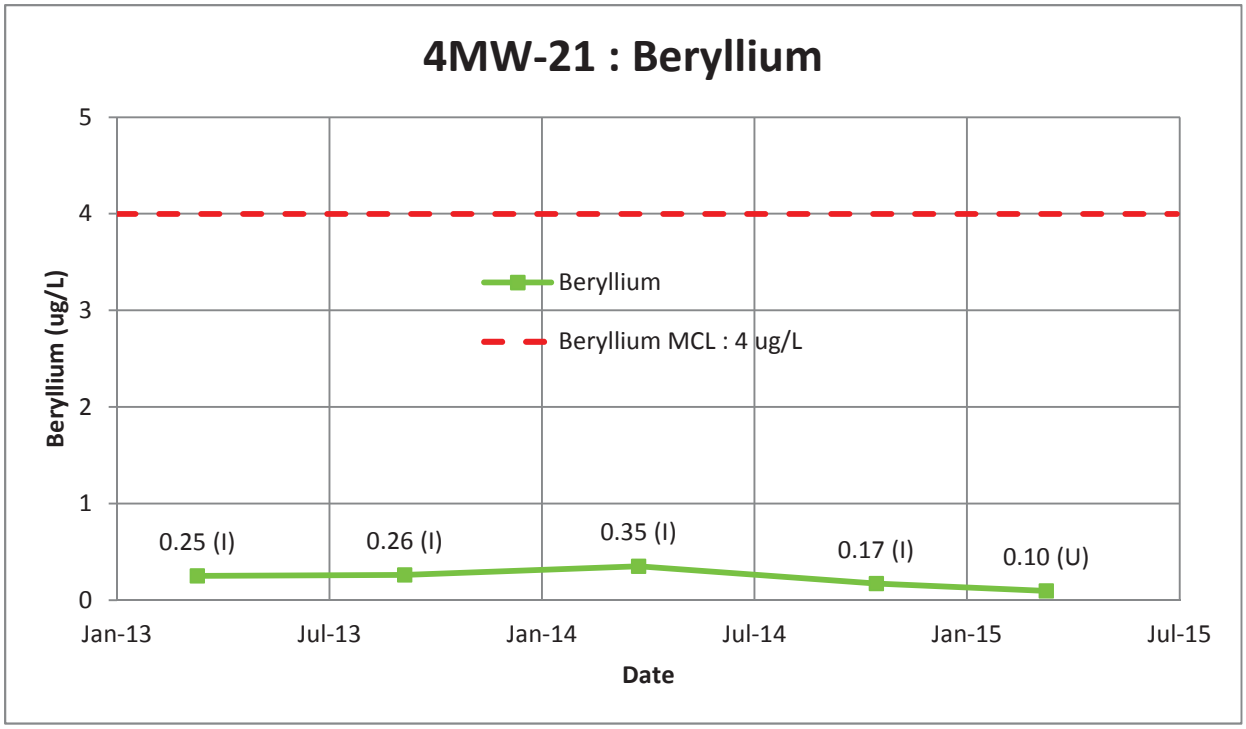
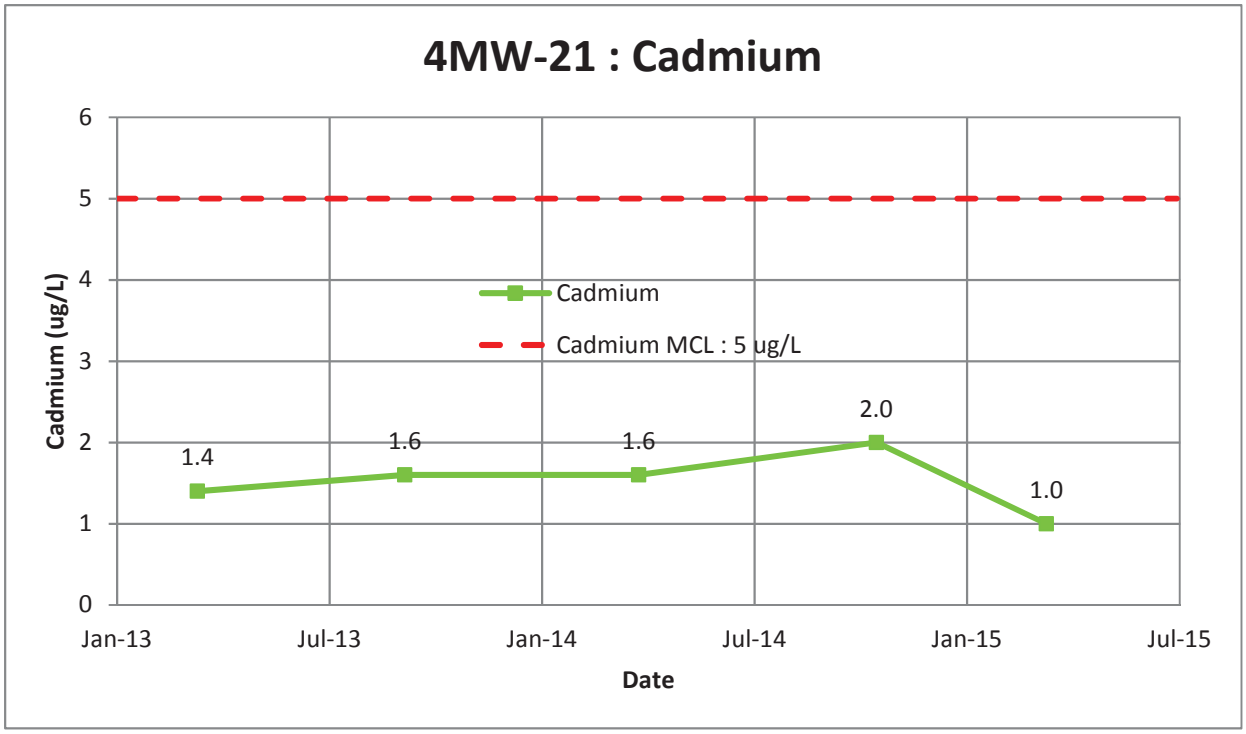


Figure B-11 Barium and Beryllium Trends for 4MW-21

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



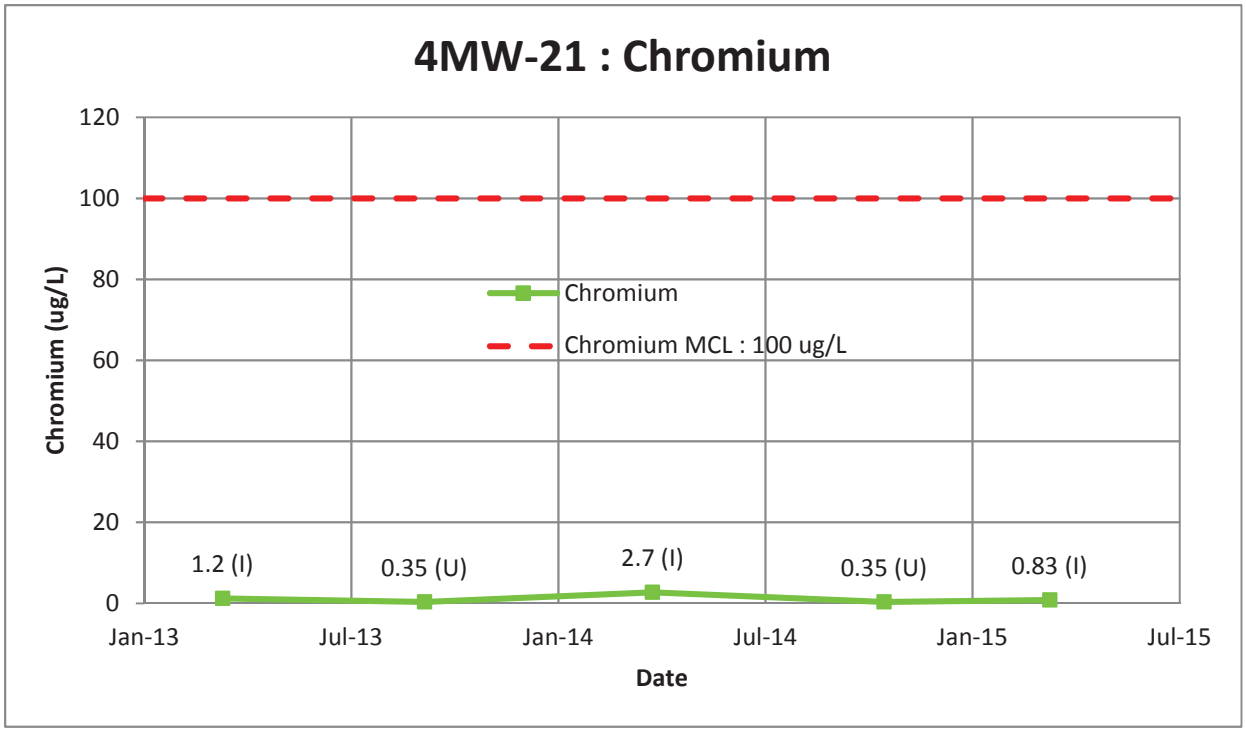
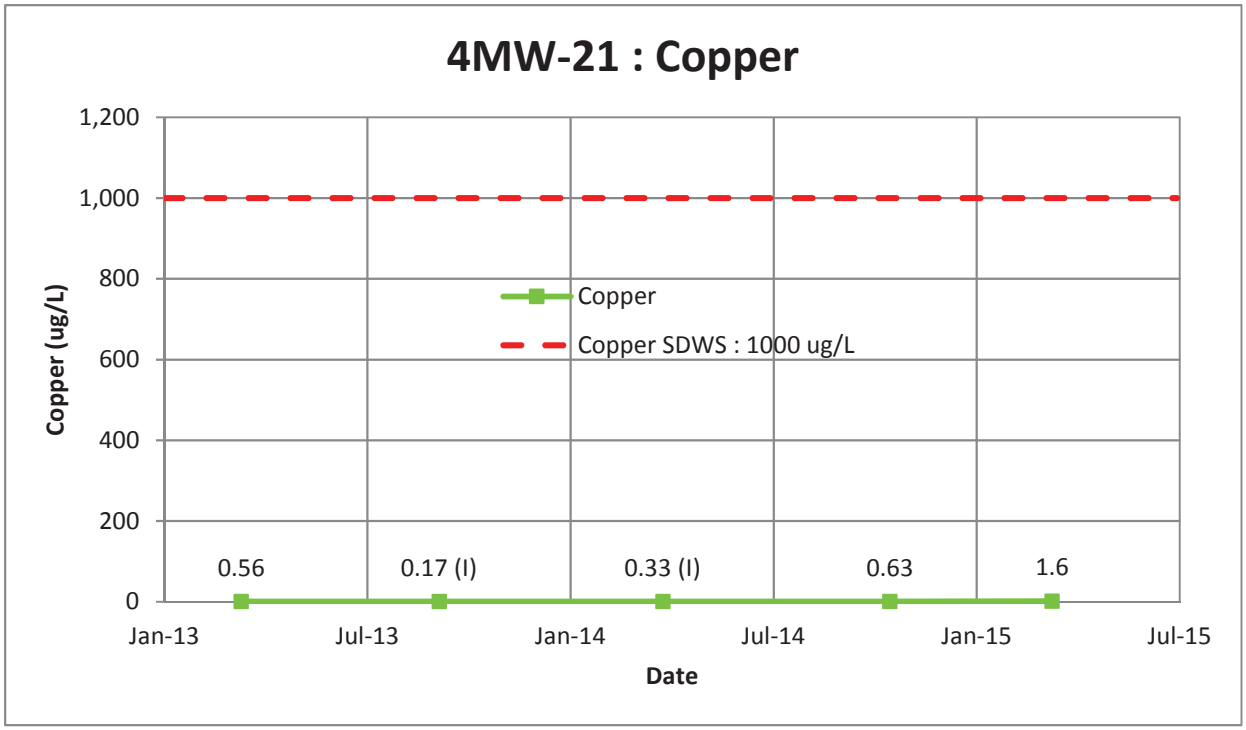


Figure B-12 Cadmium and Chromium Trends for 4MW-21

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



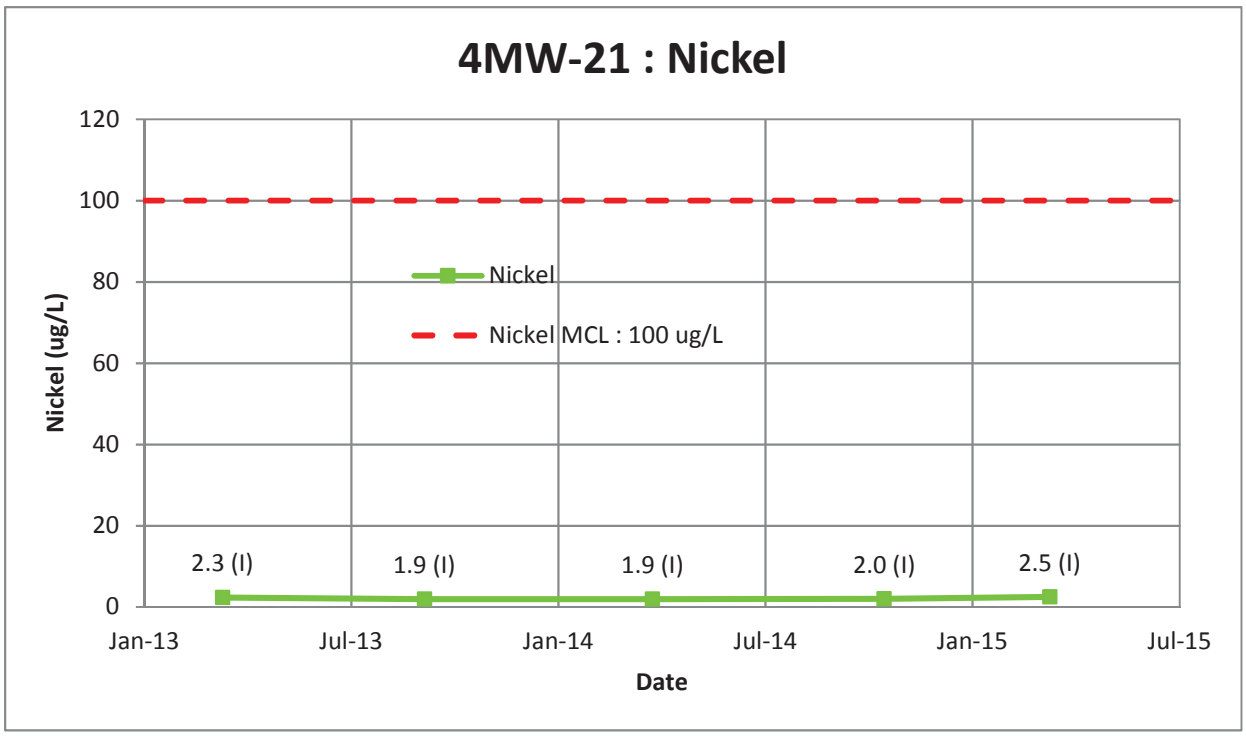


Figure B-13 Copper and Nickel Trends for 4MW-21

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab

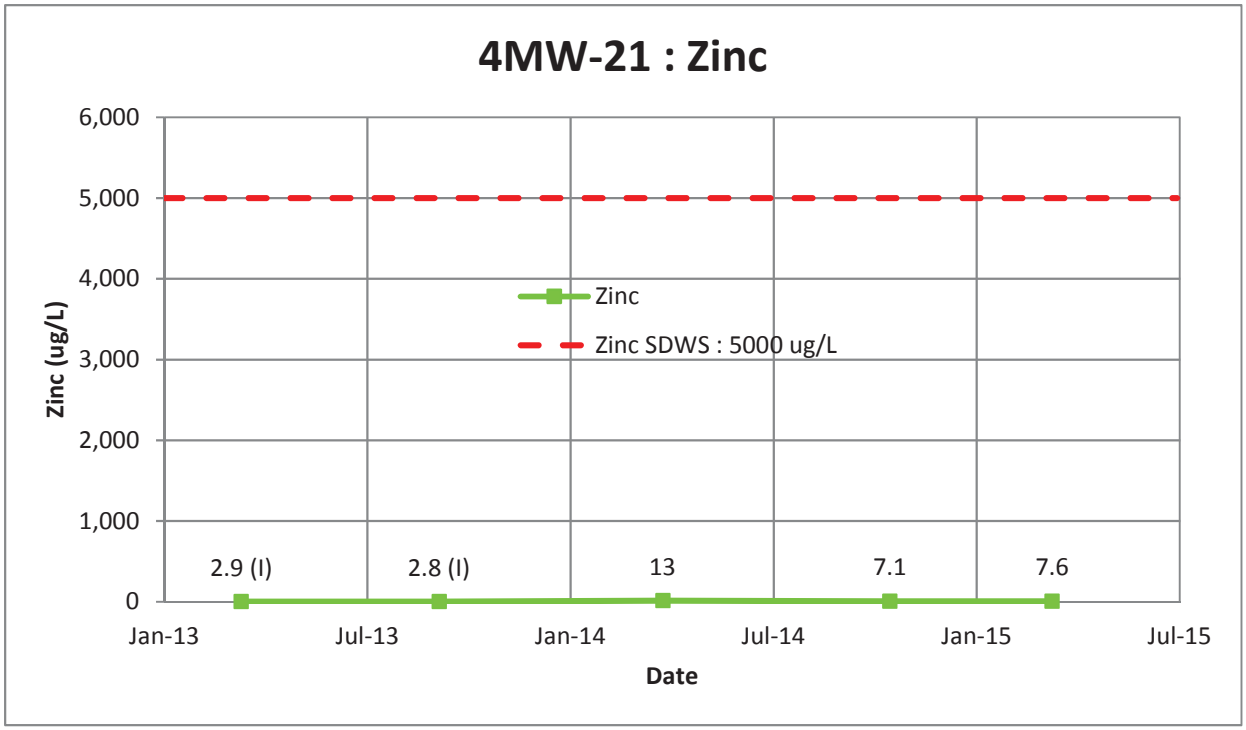
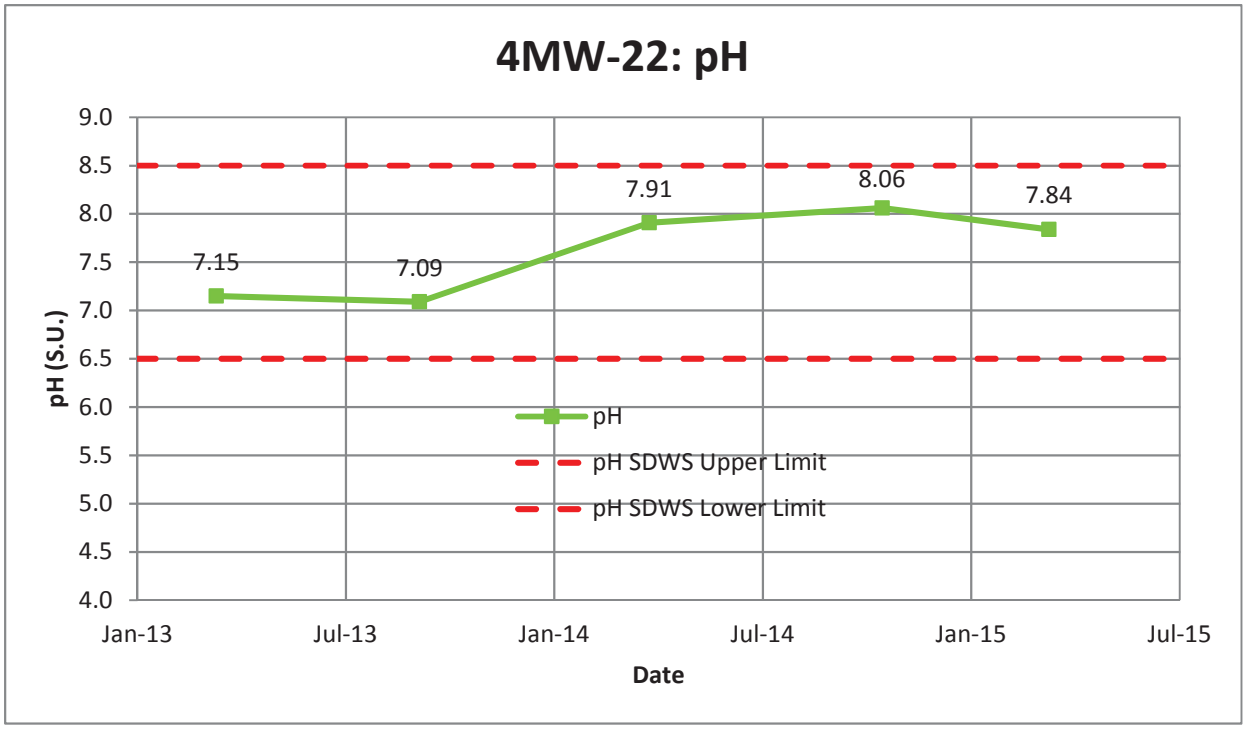


Figure B-14 Zinc Trend for 4MW-21

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



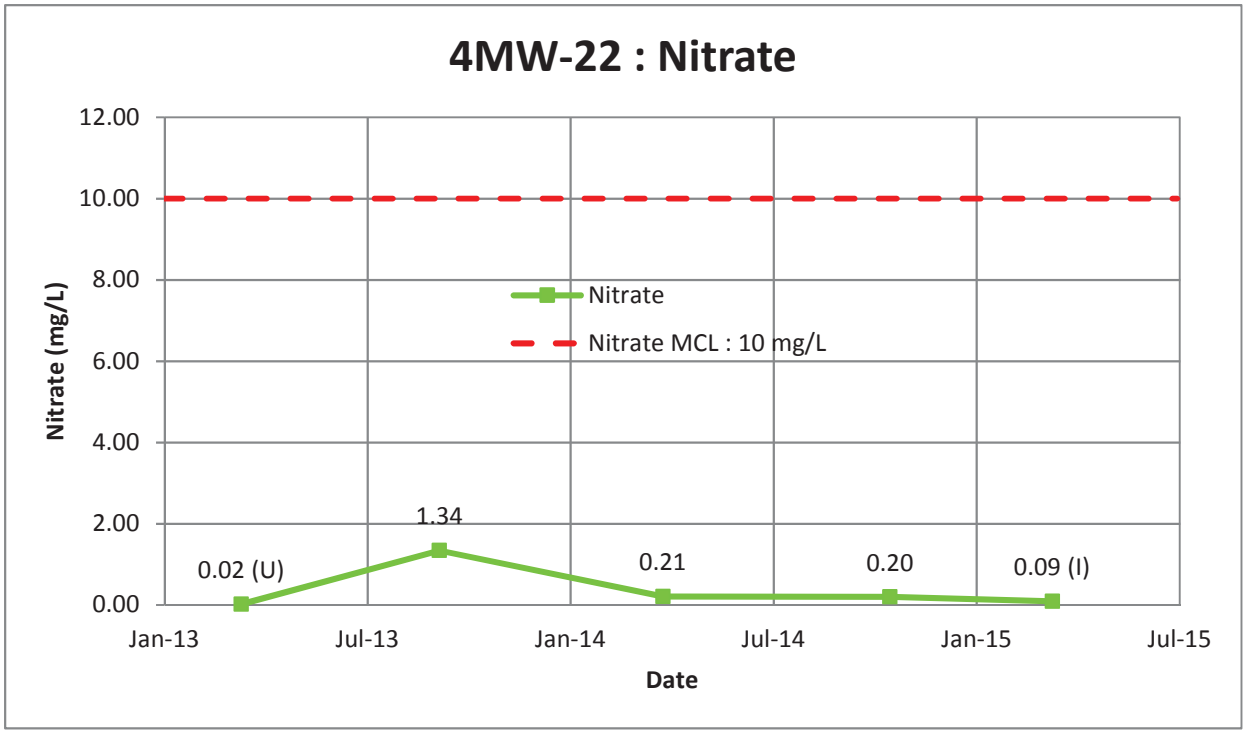
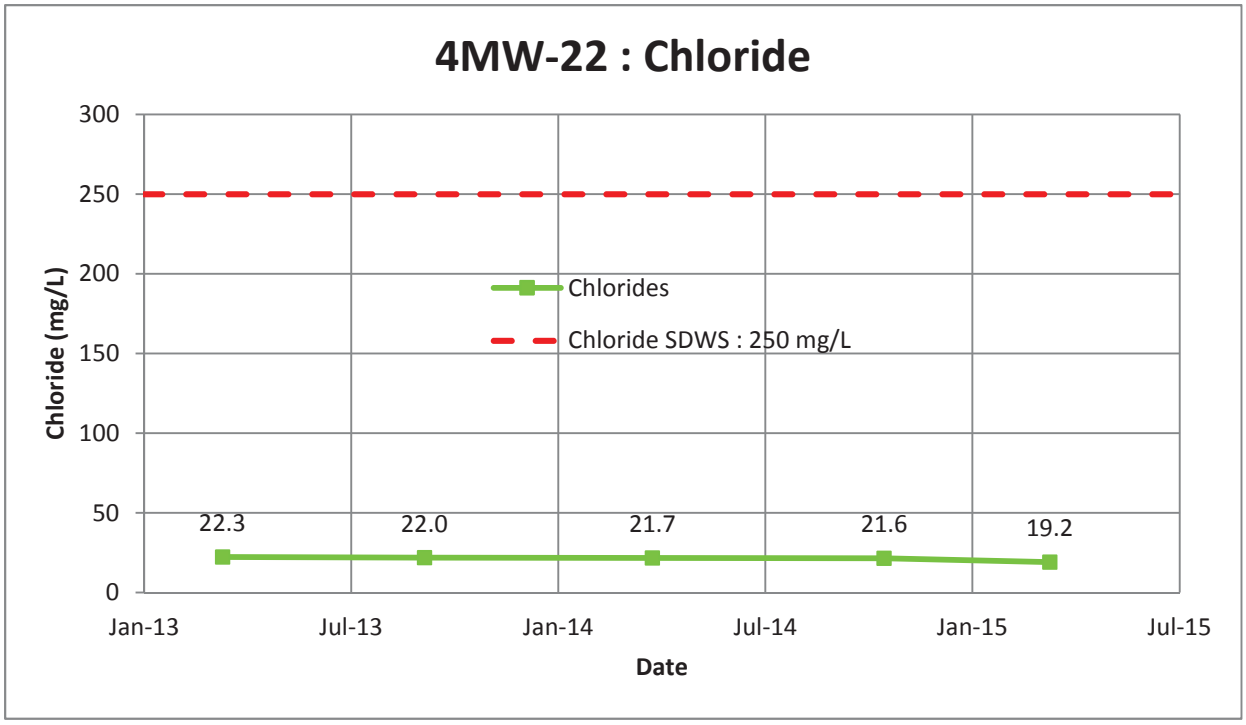


Figure B-15 pH and Nitrate Trends for 4MW-22

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



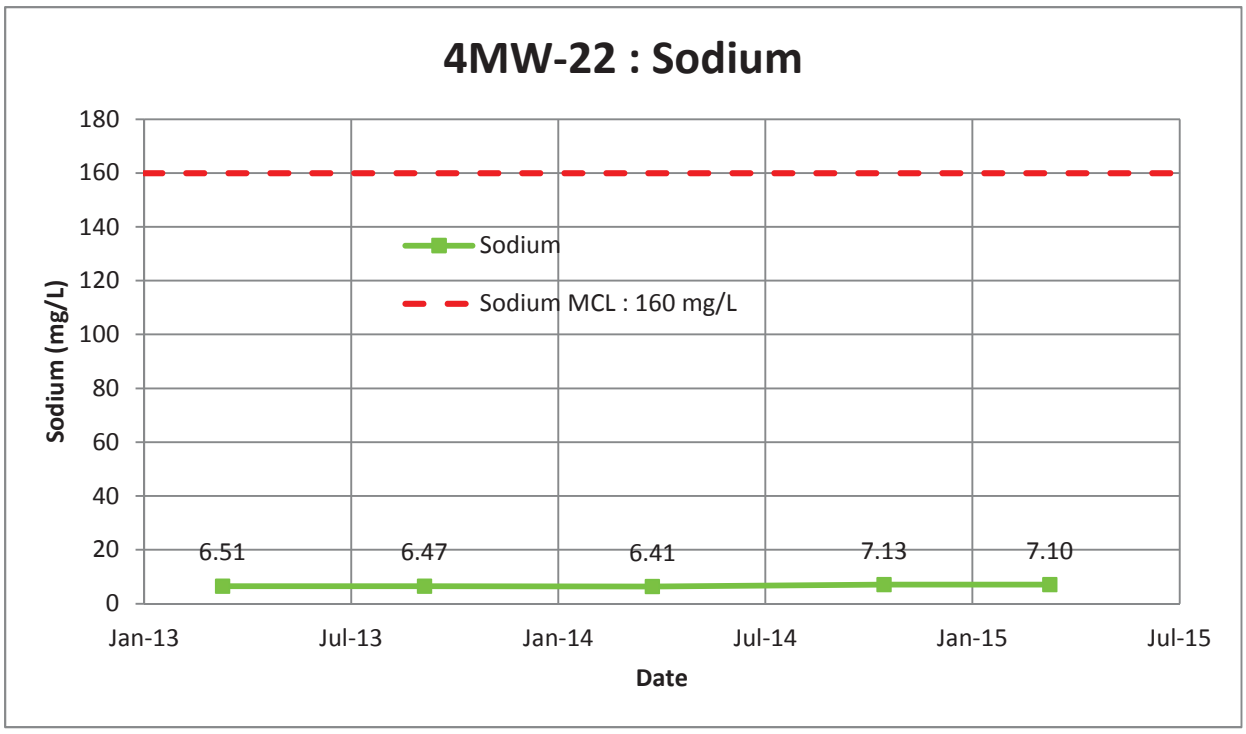
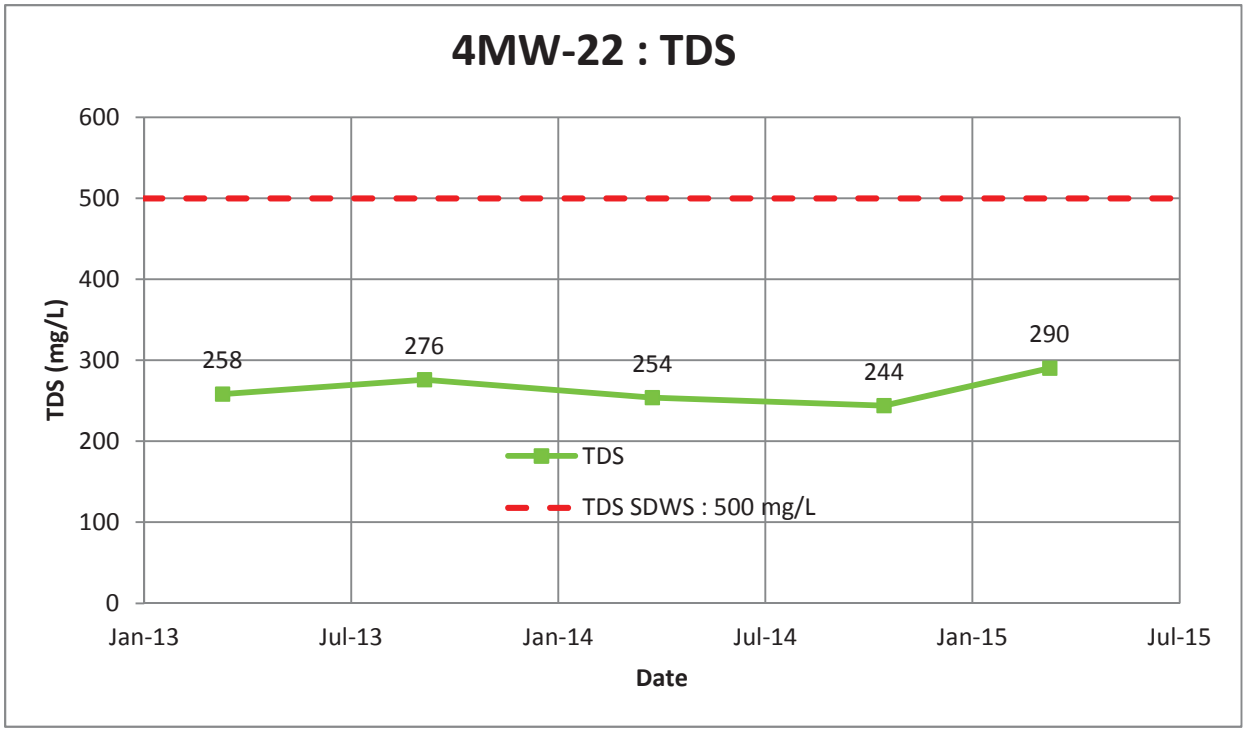


Figure B-16 Chloride and Sodium Trends for 4MW-22

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



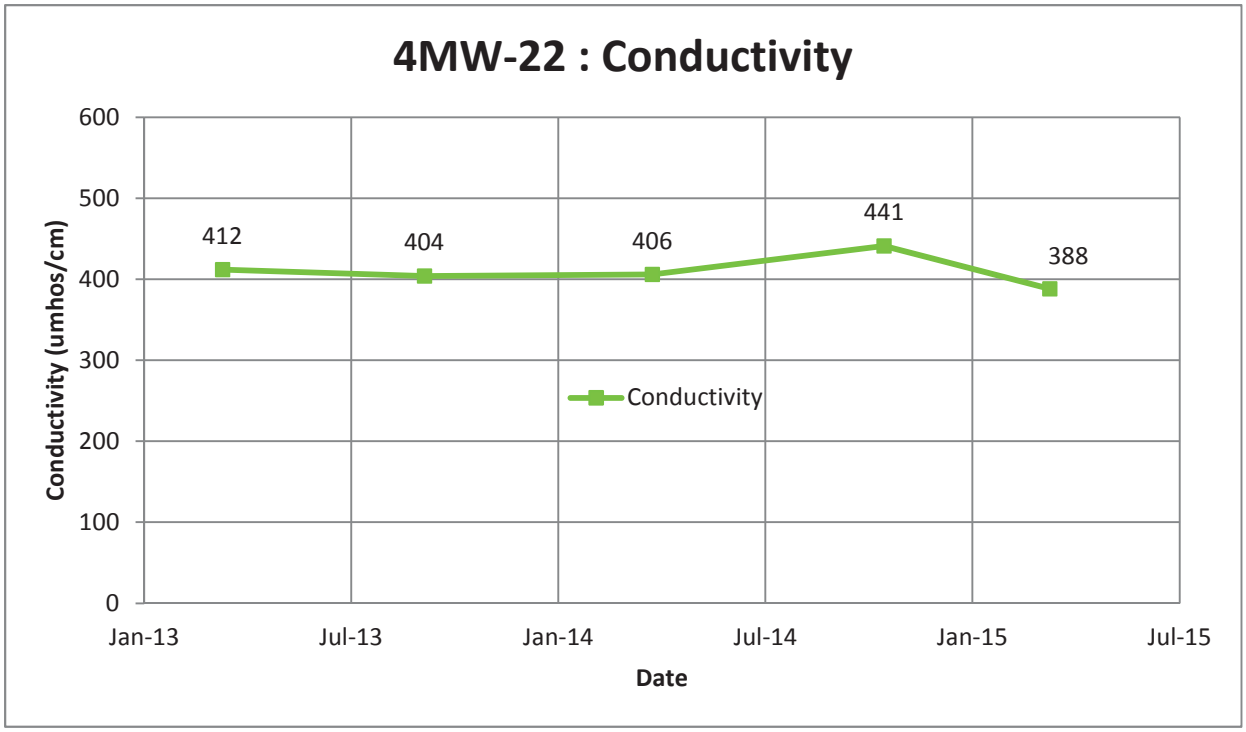
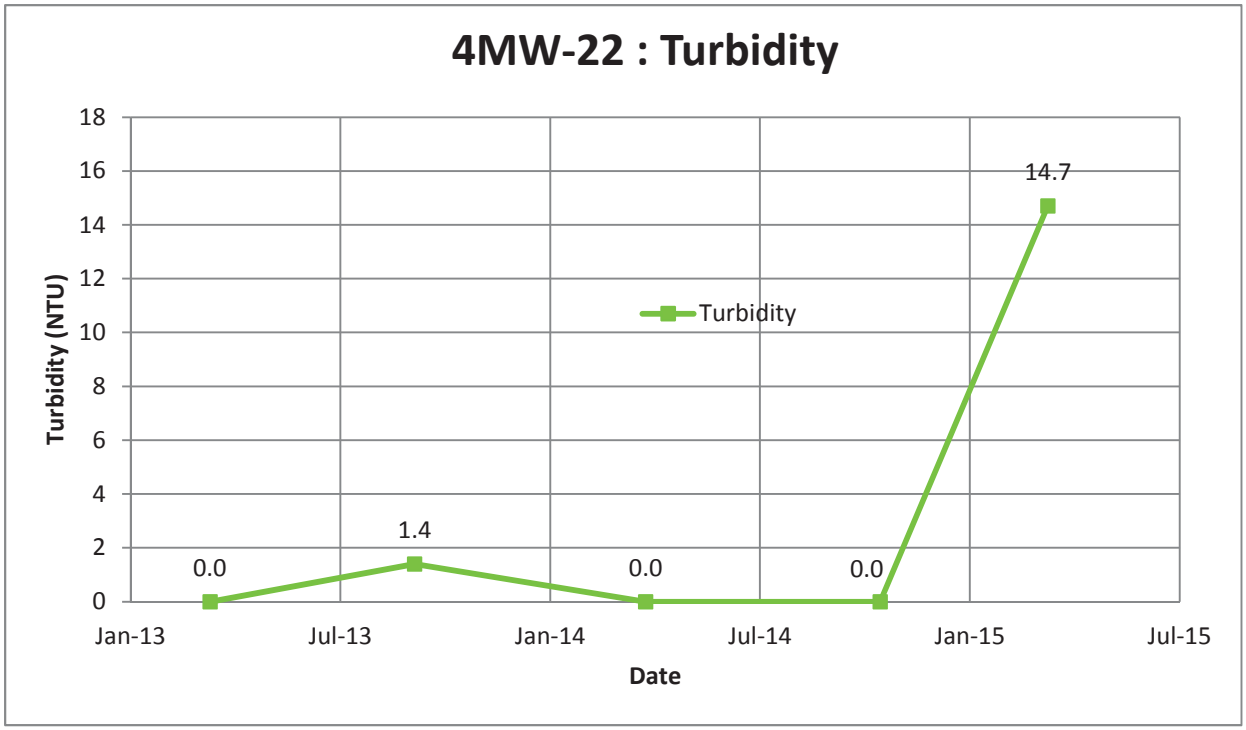


Figure B-17 TDS and Conductivity Trends for 4MW-22

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



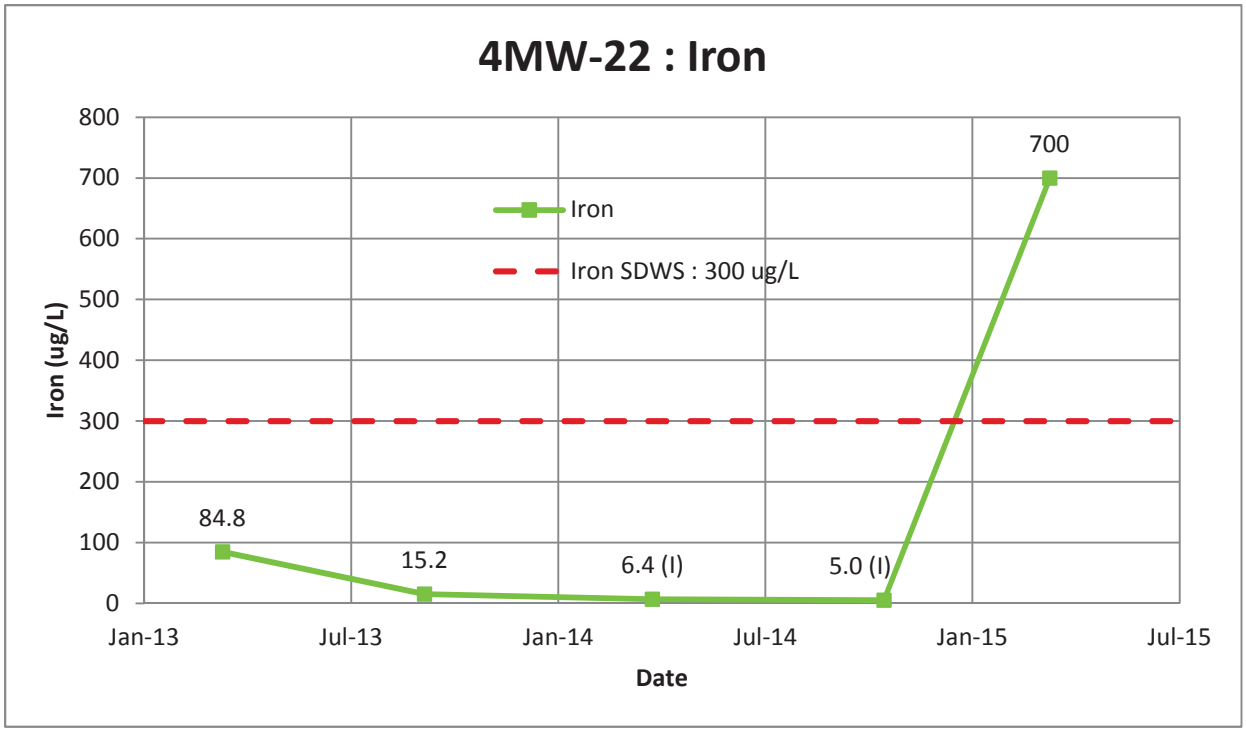
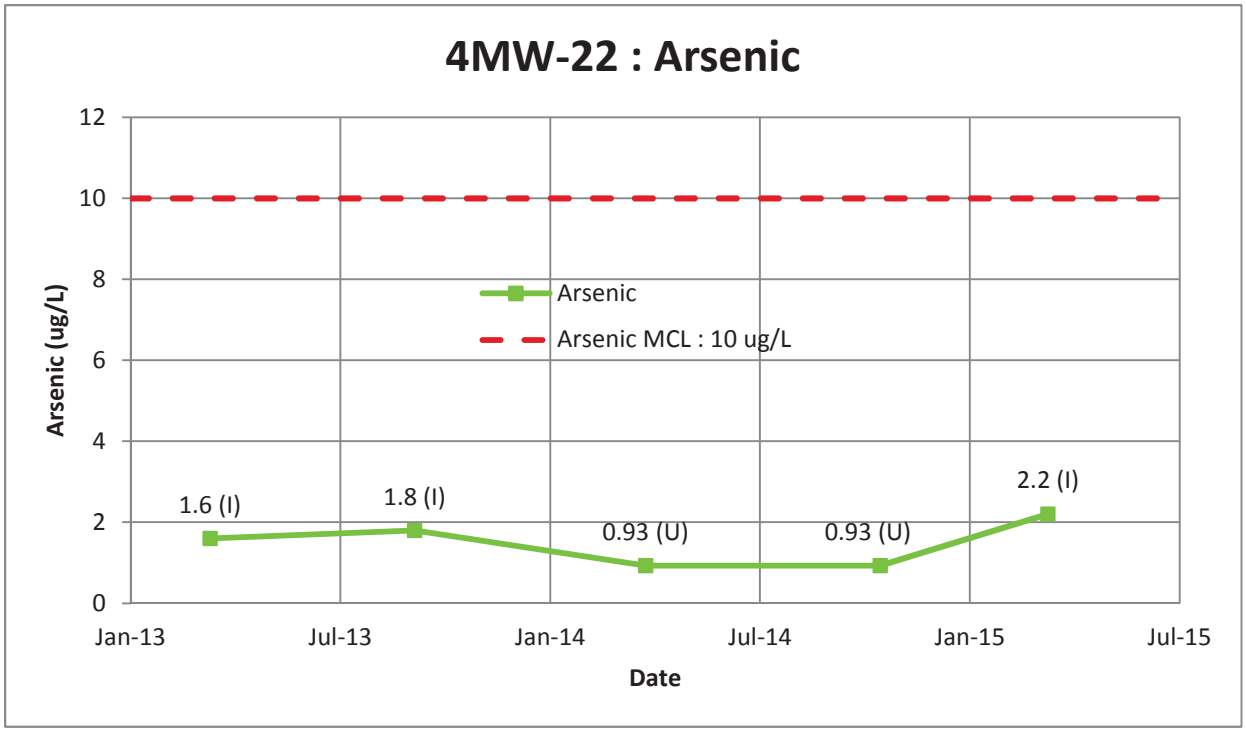


Figure B-18 Turbidity and Iron Trends for 4MW-22

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab



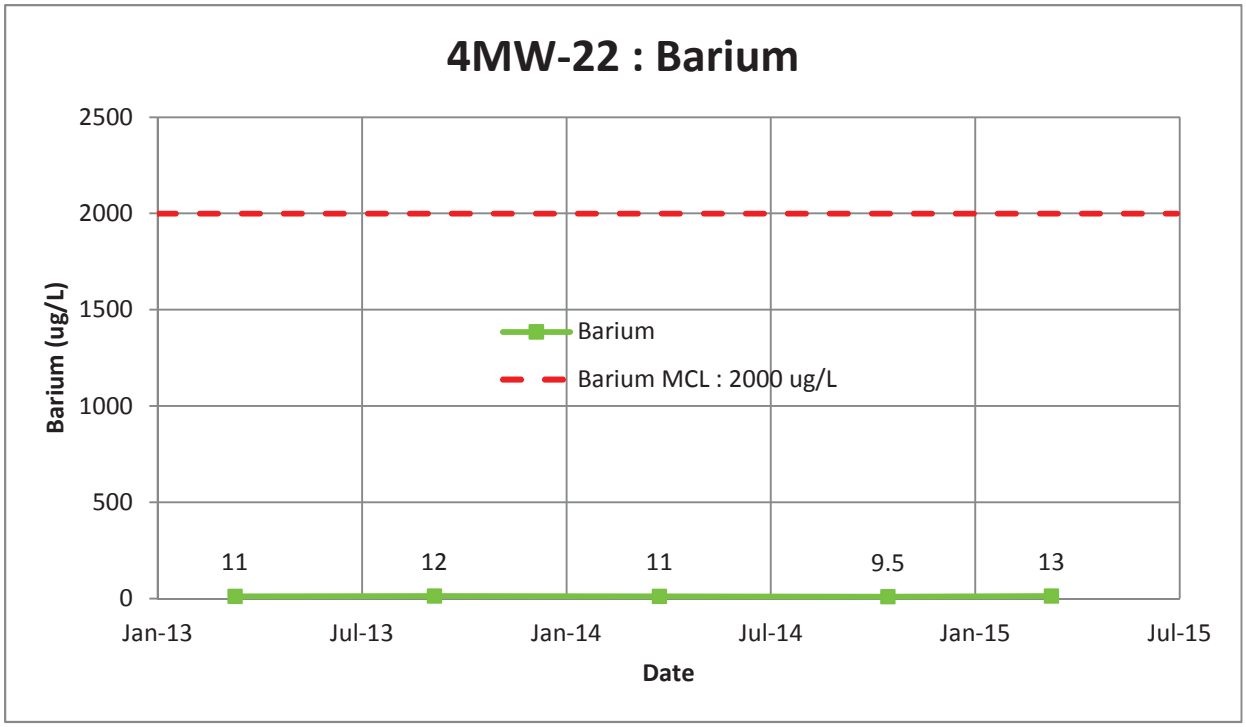
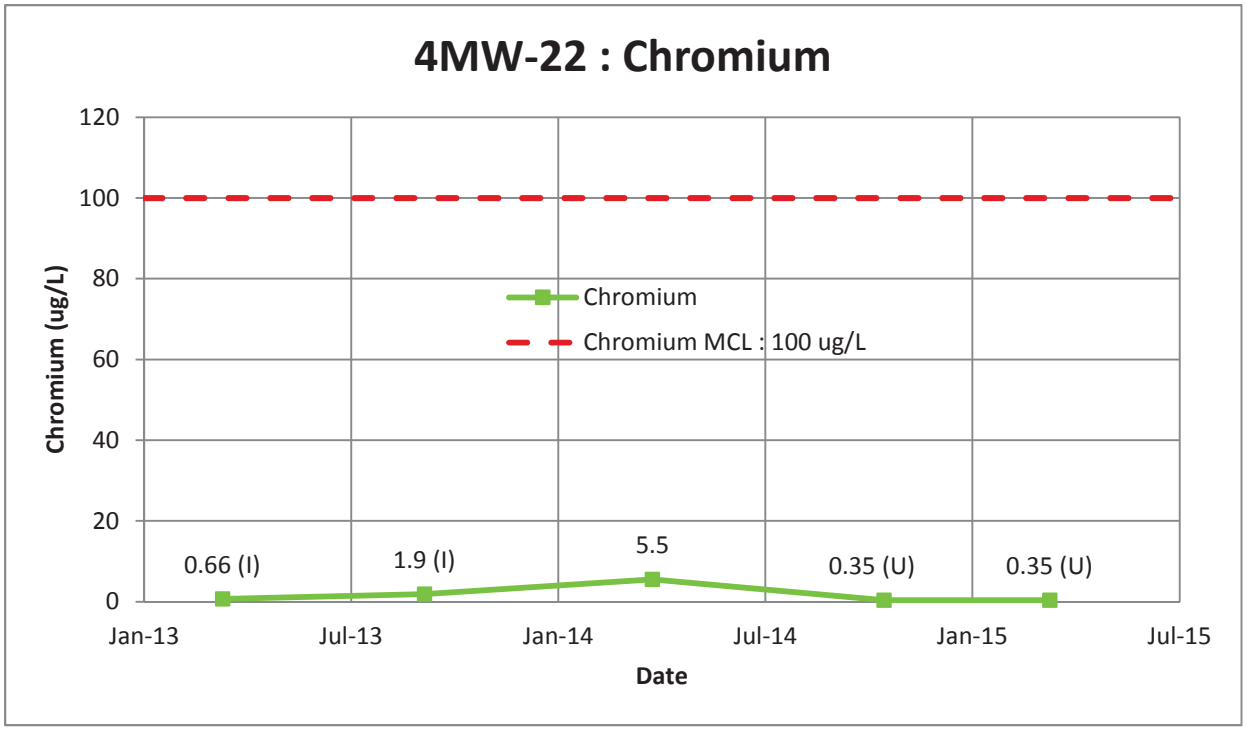


Figure B-19 Arsenic and Barium Trends for 4MW-22

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab



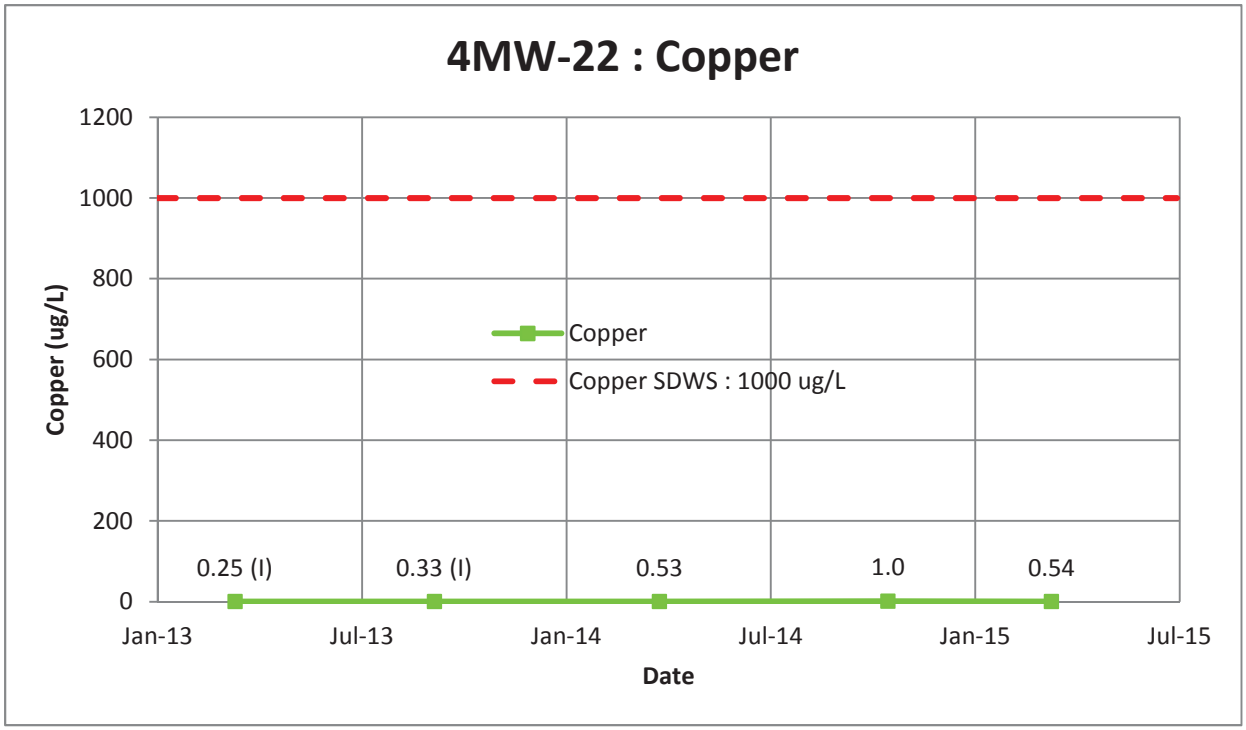


Figure B-20 Chromium and Copper Trends for 4MW-22

MCL - Maximum Contaminant Level per 62-550 F.A.C

SDWS - Secondary Drinking Water Standards per 62-550 F.A.C

Based on data provided by Pasco County Lab

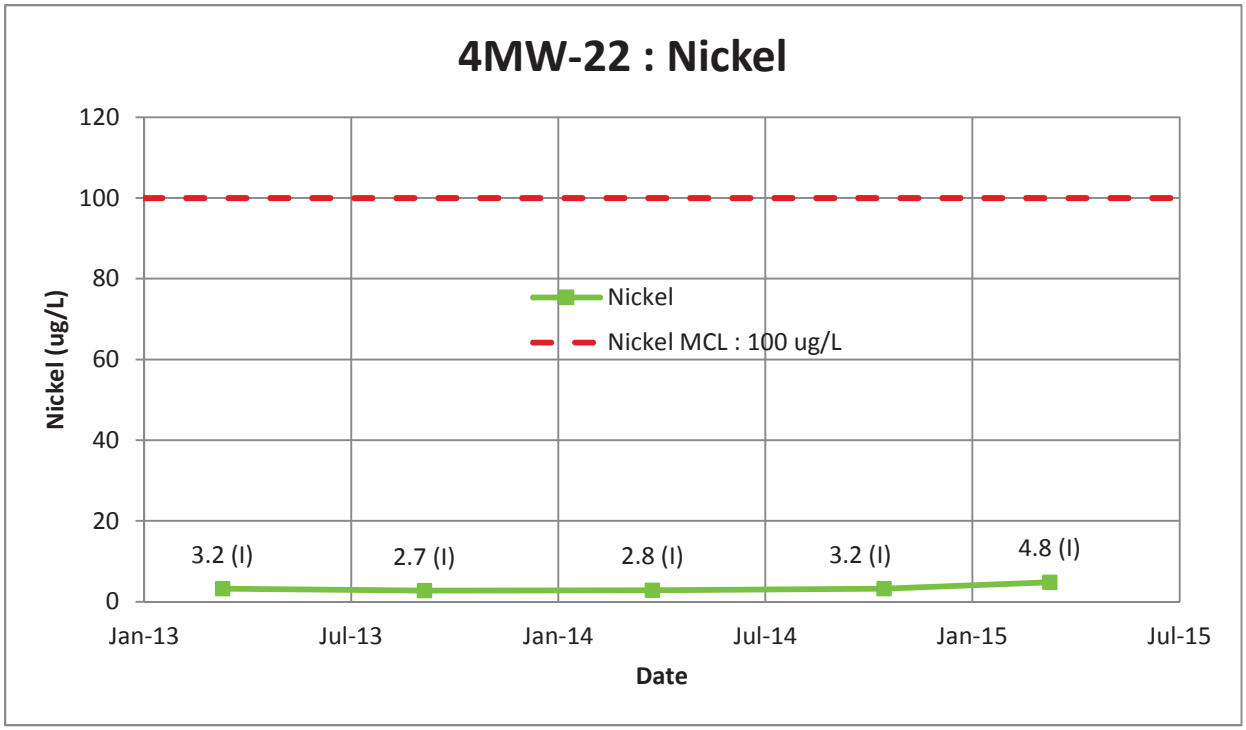


Figure B-21 Nickel Trend for 4MW-22

MCL - Maximum Contaminant Level per 62-550 F.A.C

Based on data provided by Pasco County Lab

Summary of Leachate Results

Table B-2. Summary of Field Parameters and Detected Analytes: 2013-2015 : Leachate

Test Site ID #: 4051A16325

Parameter	Units	Toxicity Characteristic Criteria	2013			
			2/19/13		10/1/13	
			Tank 1	Tank 2	Tank 1	Tank 2
1,1-Dichloroethane	ug/l		0.2 U	0.2 U	0.2 I	0.2 U
1-Methylnaphthalene	ug/l		1.1	0.026 U	0.91	0.044 I
2,4,5-Trichlorophenol	ug/l	400,000	0.2 U	0.04 U	0.5 I	0.04 U
2,4,6-Trichlorophenol	ug/l	2,000	0.3 U	0.06 U	0.5 I	0.06 U
2-Methylnaphthalene	ug/l		0.64	0.046 U	0.42	0.052 I
Acenaphthene	ug/l		1.7	0.2 U	1.5	0.2 U
Acenaphthylene	ug/l		0.027 U	0.027 U	0.13 I	0.027 U
Acetone	ug/l		10	2 U	8.8	2.5 I
Alkalinity	mg/L		2046	758	1310	141
Ammonia (N)	mg/L		70	0.26	NA	NA
Anthracene	ug/l		1.6	0.044 U	1.9	0.045 U
Antimony	ug/l	5000	5.6	2	0.42 I	0.87
Arsenic	mg/l	5.0	0.63	0.0072	0.062	0.0066
Barium	mg/l	100	0.0023	0.0028	0.22	0.0026
Benzene	ug/l	500	4.9	0.2 I	3.7	0.2 I
Benzo(a)pyrene	ug/l		0.035 U	0.035 U	0.13 I	0.035 U
Bis(2-ethylhexyl)phthalate (DEHP)	ug/l		5 I	9	16	5
Carbon disulfide	ug/l		1.6	0.2 U	2.1	0.2 U
Chlorides	mg/l		305	8.75	182	37.4
Chlorobenzene	ug/l	100,000	0.1 I	0.1 U	0.2 I	0.1 U
Chromium	mg/l	5.0	0.13	4 I	0.064	0.001 I
Chrysene	ug/l		0.65	0.036 U	0.49	0.036 U
cis-1,2-Dichloroethene	ug/l		0.3 I	0.09 U	0.3 I	0.09 U
Conductivity	umhos/cm		4510	288	2910	413
Copper	ug/l		3.5	3.3	17	2.5
Cyanide, Total	mg/l		0.005 I	0.0024 U	0.013 I	0.0024 U
Dibenzofuran	ug/l		0.2 U	0.04 U	0.7 I	0.04 U
Diethyl phthalate	ug/l		0.7 U	0.5	4 V	0.9 V
Dimethyl phthalate	ug/l		2 I	0.9 I	1 I	0.2 I
Di-n-butyl phthalate	ug/l		3 V	2 V	4 V	2 V
Dissolved Oxygen	mg/l		0.17	5.44	1.05	2650
Ethylbenzene	ug/l		6.2	0.3 I	5.9	0.2 I
Fluoranthene	ug/l		0.022 U	0.022 U	0.083 I	0.022 U
Fluorene	ug/l		0.85	0.035 U	0.87	0.035 U
Iron	ug/l		196	259	219	606
Lead	ug/l	5,000	0.25 U	0.64	0.25 U	0.25 U
Mercury	ug/l	200	0.18	0.1 U	0.06 I	0.03 U
Methylene chloride	ug/l		0.2 I	0.2 U	0.2 I	0.2 U
Napthalene	ug/l		4.4	0.13 U	4.4	0.22
Nickel	ug/l		17	2.1 I	23	2.8 I
Nitrate	mg/l		0.02 U	0.93	0.03 U	6.41
pH	S.U.		5.66	6.43	6.99	7.15
Phenanthrene	ug/l		0.45	0.023 U	0.5	0.024 U
Phenolics	ug/l		49 I	13 I	310	5 U
Pyrene	ug/l		0.093 I	0.018 U	0.05 I	0.018 U
Residues- Filterable (TDS)	mg/l		2790	155	2126	306
Selenium	ug/l	1000	6.9	0.93 U	0.0054	0.93 U
Sodium	mg/l		286	9.1	171	9.5
Sulfide	mg/l		60	0.39 I	43	0.61
Temperature	°C		19.24	20.06	27.45	29.47
Toluene	ug/l		1.9	0.3 I	1.7	0.2 I
Vanadium	ug/l		15	7.8 U	12	7.8 U
Xylene	ug/l		6.9	0.3 I	5.4	0.1 U
Zinc	ug/l		8.7	6.8	5.1	4.9 I

NOTE:

- Criteria for Toxicity Characteristic established in Table 1 of 40 CFR Part 261.24
- Concentrations highlighted with yellow represent detections that exceed the established Toxicity Characteristic criteria
- NA - Not Analyzed
- µmhos/cm - micromohs per centimeter
- S.U. - Standard Unit
- °C - degrees Centigrade
- mg/l - milligrams per liter
- NTU - nephelometric turbidity units
- ug/L - micrograms per liter
- U = Analyte was not detected. Concentration presented is the method detection level (MDL).
- I = Analyte concentration is within the method dection accuracy. The reported value is between the laboratory MDL and the laboratory practical quantitation limit (PQL).
-V = Analyte was detected in both the sample and the associated method blank.